

Chapter 8

Railroad Locomotive Safety Standards Part 229

Introduction

The Federal Railroad Administration revised those sections of 49 CFR Part 230 that dealt with Other Than Steam Locomotives and codified them under Part 229, which became effective on May 1, 1980.

The following provides guidelines to be used by Federal and State Inspectors when conducting inspections of locomotives for compliance with federal laws and regulations. It is important that agency enforcement policies be adhered to by every Inspector when conducting inspections, so that uniformity of enforcement activity is achieved.

The procedures and guidance provided in both this manual and the General Manual should be observed when assessing the need for appropriate corrective actions regarding non-compliance with locomotive safety standards. When an MP&E Inspector determines that a deficiency exists on a locomotive which may not be conducive to safe operation, the Inspector must decide if the defect(s):

- # Is a Part 229 defect;
- # Should be documented on the F6180.96 - Inspection Report;
- # Warrants the issuance of a violation;
- # Warrants the issuance of a Special Notice for Repair; and/or
- # Should be reported to the railroad as an unsafe condition(s), not encompassed in Federal regulation.

MP&E Inspectors will conduct most of their locomotive inspections at either a facility where periodic, annual, and biennial tests are performed, or at a location where locomotives are serviced and prepared for train service. However, with the increase of locomotive calendar day inspections being performed by railroad transportation department employees away from mechanical facilities, it is important that the MP&E Inspectors schedule time to monitor these practices for full compliance with the regulations.

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A locomotive should comply with all of the requirements of Part 229 and be free of any defects. Keep in mind, a locomotive may not be absolutely clean and free of all accumulations of oil, but still be in compliance. The Locomotive Safety Standards address conditions which create an unsafe working environment, an unsafe condition, or an unsafe locomotive. It does not address housekeeping practices of a railroad. Anytime a Federal defect is found on a locomotive that has just been placed into service after receiving a periodic test, a violation should be strongly considered.

When an Inspector discovers and substantiates a defective condition that he/she believes makes a locomotive unsafe and not fit for service, a **Special Notice For Repair** may be issued to the railroad. The Notice should describe the condition or conditions for which it was issued. Except in rare circumstances, a violation must be submitted with any Special Notice For Repair.

Any railroad employee who authorizes the willful movement or operation of a non-complying or unsafe locomotive, and who has knowledge of the circumstances, can be held personally responsible for the action. The Inspector should judge all pertinent facts and determine if it can be documented that the railroad employee can be cited for willful noncompliance with Federal regulations. Prior to advising a railroad employee that he/she will be cited for a willful violation, the Inspector must coordinate such action in accordance with established procedures. **(See General Manual.)**

Locomotive Safety Standards Inspection Procedures

Upon arrival at an inspection point where mechanical department personnel are assigned to perform locomotive inspection, testing and repair, the Inspector should notify the local supervision of his/her presence and intentions. It is up to the railroad as to whether an employee will accompany the Inspector. However in some instances, it is not always advantageous to notify the railroad of FRA presence, especially if an inspection is related to a complaint or investigation.

It is not necessary for FRA Inspectors to obtain "blue signal" protection when conducting any type of inspection activity. However, Inspectors should be alert and not place themselves in a position where the unexpected movement of equipment subjects them to the danger of personal injury. Railroad representative(s) accompanying the Inspector during the inspection must obtain blue signal protection if they engage in activities that require them to work on, under, or between the equipment.

Testing or operating any railroad equipment shall be performed by railroad personnel, **not** FRA Inspectors. Where practical, the Inspector should observe tests of the air brakes, speed indicators,

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high voltage ground protection, and wheel slip/slide protection. Point out any observed conditions, whether covered by the regulations or not, that would jeopardize employee safety and/or the safe operation of the equipment.

After the inspection, advise the proper railroad representative of all non-complying conditions. The Inspector must use discretion in evaluating the condition of the equipment and whether or not to cite the defects on his/her inspection report. Although a railroad need not have knowledge of a non-complying condition on a locomotive to be assessed a civil penalty under the Locomotive Safety Standards, each Inspector is expected to use sound judgment along with the guidance outlined in the General Manual, when deciding whether the issuance of a violation report is appropriate under the circumstances. The purpose of the civil penalty is to promote compliance, not punish a railroad for each and every non-complying condition regardless of the circumstances. Accordingly, each Inspector should limit the issuance of violation reports to situations where civil penalties will promote compliance. If a railroad makes a serious, good-faith effort to comply with standards, the filing of a violation report for an isolated, difficult to detect, non-complying condition would serve no valid enforcement purpose.

The railroad should be notified of all cited conditions in a timely manner, so that appropriate corrective action can be taken. Inspectors do not have the option or authority to authorize a railroad to use a non-complying locomotive once a defective condition is cited. The Inspection Report should be completed and appropriate copies given to the railroad representative. If the inspection report cannot be prepared immediately after the inspection, then one must be completed during the next work period and delivered or forwarded to a railroad representative.

Regulation:

Subpart A - General

§229.1 Scope.

This part prescribes minimum Federal safety standards for all locomotives except those propelled by steam power.

§229.3 Applicability.

(a) Except as provided in paragraph (b) through (e) of this section, this part applies to all standard gage railroads.

(b) This part does not apply to:

- (1) A railroad that operates only on track inside an installation which is not part of the general railroad system of transportation; or
- (2) Rapid transit operations in an urban area that are not connected with the general railroad system of transportation.

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(c) Paragraphs (a) and (b) of §229.125 do not apply to Tier II passenger equipment as defined in §238.5 of this chapter (i.e., passenger equipment operating at speeds exceeding 125 mph but not exceeding 150 mph).

(d) On or after November 8, 1999, paragraphs (a)(1) and (b)(1) of §229.141 do not apply to “passenger equipment” as defined in §238.5 of this chapter; unless such equipment is excluded from the requirements of §§238.203 through 238.219, and §238.223 of this chapter by operation of §238.201(a)(2) of this chapter.

(e) Paragraphs (a)(2) through (a)(4), and (b)(2) through (b)(4) of §229.141 do not apply to “passenger equipment” as defined in §238.5 of this chapter that is placed in service for the first time on or after September 8, 2000, unless such equipment is excluded from the requirements of §§238.203 through 238.219, and §238.223 of this chapter by operation of §238.201(a)(2) of this chapter.

Guidance:

(b)(1) The Inspector should be aware that if a locomotive(s) of a private industry operates over a portion of a general railroad system’s yard or tracks, such locomotives must be in compliance with the Locomotive Safety Standards and other appropriate regulations. Legal action could be taken against the industrial railroad if their locomotives are not in compliance, but FRA usually holds the general railroad responsible and liable for the industrial locomotives which it permits to be used on its lines. If an industry leases a track in an adjacent railroad yard for its exclusive use, it may operate over that track as if it were part of the industrial facility and the locomotives do not come under the Locomotive Safety Standards. (*See 49 CFR 209 Appendix A.*) Whenever there is a question as to whether a railroad’s operation and/or equipment falls under the requirements of Part 229, the Regional office should be contacted for confirmation.

Regulation:

§229.4 Information Collection.

Guidance:

This part relates to information collection under part 229, which was reviewed by the Office of Budget and Management. No enforcement action is attached to this part.

Regulation:

§ 229.5 Definitions.

As used in this part—

Break means a fracture resulting in complete separation into parts.

Cab means that portion of the superstructure designed to be occupied by the crew operating the locomotive.

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Carrier means *railroad*, as that term is in this section.

Commuter service means the type of railroad service described under the heading “Commuter Operations” in 49 CFR part 209, Appendix A.

Commuter work train is a non-revenue service train used in the administration and upkeep service of a commuter railroad.

Control cab locomotive means a locomotive without propelling motors but with one or more control stands.

Controlling remote distributed power locomotive means the locomotive in a distributed power consist that receives the coded signal from the lead locomotive consist of the train whether commanded automatically by the distributed power system or manually by the locomotive engineer.

Crack means a fracture without complete separation into parts, except that castings with shrinkage cracks or hot tears that do not significantly diminish the strength of the member are not considered to be cracked.

Cruise control means a device that controls locomotive power output to obtain a targeted speed. A device that functions only at or below 30 miles per hour is NOT considered a “cruise control” for purposes of this part.

Data element means one or more data point or value reflecting on-board train operations at a particular time. Data may be actual or “passed through” values or may be derived from a combination of values from other sources.

Dead locomotive means—

- (1) A locomotive, other than a control cab locomotive, that does not have any traction device supplying tractive power; or
- (2) A control cab locomotive that has a locked and unoccupied cab.

Distributed power system means a system that provides control of a number of locomotives dispersed throughout a train from a controlling locomotive located in the lead position. The system provides control of the rearward locomotives by command signals originating at the lead locomotive and transmitted to the remote (rearward) locomotives.

DMU locomotive means a diesel-powered multiple unit operated locomotive with one or more propelling motors designed to carry passenger traffic.

Electronic air brake means a brake system controlled by a computer which provides the means for control of the locomotive brakes or train brakes or both.

Event recorder means a device, designed to resist tampering, that monitors and records data, as detailed in § 229.135(b), over the most recent 48 hours of operation of the electrical system of the locomotive on which the device is installed. However, a device, designed to resist tampering, that monitors and records the specified data only when the locomotive is in motion meets this definition if the device was installed prior to November 5, 1993 and if it records the specified data for the last eight hours the locomotive was in motion.

Event recorder memory module means that portion of the event recorder used to retain the recorded data as detailed in § 229.135(b).

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High voltage means an electrical potential of more than 150 volts.

In-service event recorder means an event recorder that was successfully tested as prescribed in § 229.27(d) and whose subsequent failure to operate as intended, if any, is not actually known by the railroad operating the locomotive on which it is installed.

Lead locomotive means the first locomotive proceeding in the direction of movement.

Lite locomotive means a locomotive or a consist of locomotives not attached to any piece of equipment or attached only to a caboose.

Locomotive means a piece of on-track equipment other than hi-rail, specialized maintenance, or other similar equipment—

- (1) With one or more propelling motors designed for moving other equipment;
- (2) With one or more propelling motors designed to carry freight or passenger traffic or both; or
- (3) Without propelling motors but with one or more control stands.

Mandatory directive means any movement authority or speed restriction that affects a railroad operation.

Modesty lock means a latch that can be operated in the normal manner only from within the sanitary compartment, that is designed to prevent entry of another person when the sanitary compartment is in use. A modesty lock may be designed to allow deliberate forced entry in the event of an emergency.

MU locomotive means a multiple unit operated electric locomotive—

- (1) With one or more propelling motors designed to carry freight or passenger traffic or both; or
- (2) Without propelling motors but with one or more control stands.

Other short-haul passenger service means the type of railroad service described under the heading “Other short-haul passenger service” in 49 CFR part 209, Appendix A.

Potable water means water that meets the requirements of 40 CFR part 141, the Environmental Protection Agency’s Primary Drinking Water Regulations, or water that has been approved for drinking and washing purposes by the pertinent state or local authority having jurisdiction. For purposes of this part, commercially available, bottled drinking water is deemed potable water.

Powered axle is an axle equipped with a traction device.

Railroad means all forms of non-highway ground transportation that run on rails or electromagnetic guideways, including (1) commuter or other short-haul rail passenger service in a metropolitan or suburban area, and (2) high speed ground transportation systems that connect metropolitan areas, without regard to whether they use new technologies not associated with traditional railroads. Such term does not include rapid transit operations within an urban area that are not connected to the general railroad system of transportation.

Remanufactured locomotive means a locomotive rebuilt or refurbished from a previously used or refurbished underframe (“deck”), containing fewer than 25 percent previously used components (weighted by dollar value of the components).

Sanitary means lacking any condition in which any significant amount of filth, trash, or human waste is present in such a manner that a reasonable person would believe that the condition might

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constitute a health hazard; or of strong, persistent, chemical or human waste odors sufficient to deter use of the facility, or give rise to a reasonable concern with respect to exposure to hazardous fumes. Such conditions include, but are not limited to, a toilet bowl filled with human waste, soiled toilet paper, or other products used in the toilet compartment, that are present due to a defective toilet facility that will not flush or otherwise remove waste; visible human waste residue on the floor or toilet seat that is present due to a toilet that overflowed; an accumulation of soiled paper towels or soiled toilet paper on the floor, toilet facility, or sink; an accumulation of visible dirt or human waste on the floor, toilet facility, or sink; and strong, persistent chemical or human waste odors in the compartment.

Sanitation compartment means an enclosed compartment on a railroad locomotive that contains a toilet facility for employee use.

Self-monitoring event recorder means an event recorder that has the ability to monitor its own operation and to display an indication to the locomotive operator when any data required to be stored are not stored or when the stored data do not match the data received from sensors or data collection points.

Serious injury means an injury that results in the amputation of any appendage, the loss of sight in an eye, the fracture of a bone, or the confinement in a hospital for a period of more than 24 consecutive hours.

Switching service means the classification of railroad freight and passenger cars according to commodity or destination; assembling cars for train movements; changing the position of cars for purposes of loading, unloading, or weighing; placing locomotives and cars for repair or storage; or moving rail equipment in connection with work service that does not constitute a train movement.

Throttle position means any and all of the discrete output positions indicating the speed/tractive effort characteristic requested by the operator of the locomotive on which the throttle is installed. Together, the discrete output positions shall cover the entire range of possible speed/tractive effort characteristics. If the throttle has continuously variable segments, the event recorder shall capture either: (1) the exact level of speed/tractive effort characteristic requested, on a scale of zero (0) to one hundred percent (100%) of the output variable or (2) a value converted from a percentage to a comparable 0 to 8 digital signal.

Time means either “time-of-day” or “elapsed time” (from an arbitrarily determined event) as determined by the manufacturer. In either case, the recorder must be able to convert to an accurate time-of-day with the time zone stated unless it is Greenwich mean time (UTC).

Toilet facility means a system that automatically or on command of the user removes human waste to a place where it is treated, eliminated, or retained such that no solid or non-treated liquid waste is thereafter permitted to be released into the bowl, urinal, or room and that prevents harmful discharges of gases or persistent offensive odors.

Transfer service means a freight train that travels between a point of origin and a point of final destination not exceeding 20 miles and that is not performing switching service.

Unsanitary means having any condition in which any significant amount of filth, trash, or

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human waste is present in such a manner that a reasonable person would believe that the condition might constitute a health hazard; or strong, persistent, chemical or human waste odors sufficient to deter use of the facility, or give rise to a reasonable concern with respect to exposure to hazardous fumes. Such conditions include, but are not limited to, a toilet bowl filled with human waste, soiled toilet paper, or other products used in the toilet compartment, that are present due to a defective toilet facility that will not flush or otherwise remove waste; visible human waste residue on the floor or toilet seat that is present due to a toilet that overflowed; an accumulation of soiled paper towels or soiled toilet paper on the floor, toilet facility, or sink; an accumulation of visible dirt or human waste on the floor, toilet facility, or sink; and strong, persistent chemical or human waste odors in the compartment.

Washing system means a system for use by railroad employees to maintain personal cleanliness that includes a secured sink or basin, water, antibacterial soap, and paper towels; or antibacterial waterless soap and paper towels; or antibacterial moist towelettes and paper towels; or any other combination of suitable antibacterial cleansing agents.

Guidance:

Section (c): Carrier The designation carrier should not be used in referring to a railroad. The Rail Safety Improvement Act of 1988 (RSIA 88) did away with the phrase "common carrier" and required that the word "railroad" be inserted in all FRA regulations which previously used the word carrier or common carrier.

Section (d): Control Cab Locomotive This could be either a passenger coach with a control stand located at one end, where the operator can operate a passenger train with the locomotive pushing/pulling the train; or a caboose or car equipped with remote control equipment that provides an interface between the remote control transmitter (RCT) and a locomotive for remote control operation. Only those portions of the control cab locomotive which have appurtenances and items listed in Part 229 have to be in compliance with Part 229.

Section (f): Dead Locomotive A dead locomotive can have the diesel engine either idling or shut down. It cannot supply tractive effort. It must be "off-line."

Section (k): Locomotive A hi-rail vehicle is defined as a truck, automobile, or machinery with retractable flanged wheels, so it may be used on either the highway or railroad track. Specialized maintenance or other similar equipment includes track motor cars, cranes, derricks, pile drivers, rail grinders, ballast cleaners, etc. Periodically, FRA receives inquiries about equipment requirements for self-propelled vehicles used to haul revenue freight on the main line. These vehicles include those built by Trackmobile Inc., Shuttle Wagon, Mitchell Equipment Corporation and Brandt Roadrailer. Self-propelled vehicles are used in a variety of railroad functions. When self-propelled vehicles are used only in the performance of typical maintenance-of-way functions, or if they are used to move cars or equipment within the confines of repair facilities, they are to be

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considered specialized maintenance equipment and are exempt from many Federal Railroad Administration (FRA) regulations. When a self-propelled vehicle is used to move freight over the railroad, outside the limits established for maintenance-of-way operations and repair facilities, it will be considered a locomotive and must comply with applicable regulations. Even though these vehicles do not resemble a standard locomotive, the purpose for which they are being used requires compliance with 49 CFR Sections 223, 229, 231 and 232. The self-propelled vehicles are unique in construction, appearance and use. Many of these vehicles currently being used have already been modified by the manufacturers (as closely as construction would permit) to bring them into compliance with Federal regulations. FRA acknowledges that this equipment has a place in a well rounded rail transportation system. In an effort to recognize the unique characteristics of these vehicles, FRA Inspectors should exercise enforcement discretion and good judgment in analyzing an operation where self-propelled vehicles are used for train movements. Items deemed to be safety related, that cannot meet specified requirements, will have to be addressed through the waiver process. The following specifications should be used by Inspectors for enforcement guidance:

1. The vehicle glazing material must comply with Part 223.
2. Each self propelled vehicle shall be inspected each calendar day when used and an inspection report and record shall be completed as described in Section 229.21.
3. Each self propelled vehicle shall receive a periodic inspection as described in Section 229.23, and all pertinent data is to be entered on a F6180.49A Locomotive Inspection and Repair Report, which shall be displayed under a transparent cover in a conspicuous place in the cab of the vehicle.
4. The vehicle's air brake equipment must be cleaned and tested as often as conditions require, but not less frequently than required in Sections 229.25, 229.27 and 229.29.
5. The main air reservoir must comply with Section 229.31 regarding either hammer and hydrostatic testing or pre-drilling of the reservoir.
6. Vehicle must meet general Safety Requirements of Sections 229.41, 229.43 and 229.45.
7. Fuel safety cut off devices, Section 229.93.
8. The vehicle must have a speed indicator if it is operated at a speed that exceeds 20 mph. Section 229.117.
9. Interior cab noise must comply with Section 229.121.
10. Vehicle headlights must be fully functional and if operated at speeds in excess of 20 mph over one or more public highway-rail crossings, must comply with auxiliary light requirements, Section 229.129.
11. Vehicle must be equipped with an audible warning device, Section 229.129.
12. If operated at speeds in excess of 30 mph while hauling cars, vehicle must be equipped with working event recorder in compliance with Section 229.135.
13. Switching steps as defined in Section 231.30.
14. Four horizontal handholds secured to the back and front ends of the vehicle, secured by bolts or other acceptable mechanical fastener. Section 231.30.

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15. Vertical handholds painted in contrasting colors and secured by bolts or other ~~acceptable~~ fasteners, Section 231.30.
16. Must be equipped with automatic couplers, to prevent the necessity of someone going between the vehicle and car for the purpose of coupling or uncoupling, Section 231.30.
17. If conditions warrant, a two-way end-of-train device must be used, Sections 232.401-409.
18. As with any train movement, the vehicle must be equipped with a brake system that permits the operator to apply and release the brakes on cars being hauled. The brake equipment must also be arranged so that proper air brake leakage tests can be conducted as applicable, Sections 232.12 and 232.13. **(MP&E 98-71.)**

Despite the fact that the Burro Crane is excluded from the definition of “locomotive” under §229.5(I) of the Locomotive Safety Standards as a piece of specialized maintenance equipment and is not subject to those Standards, the Burro Crane is nevertheless subject to the statutory requirements of the Locomotive Inspection Act. In particular, the requirement that it be safe. In the preamble to the final locomotive rules, FRA explicitly recognizes the applicability of the Act by stating that “FRA will continue to implement the basic statutory safety requirements with respect to such work equipment by using the Special Notice For Repair when appropriate.” 45 FR 21093. **(MP&E 98-25.)**

Section(l): *MU Locomotive* This refers to the self propelled transit cars in commuter service in various large urban centers around the country. This section does not apply to the common vernacular of the railroad industry, whereby MU locomotive is a generic term given to any locomotive which can be coupled in a consist with other locomotives and controlled from a single control location.

Regulation:

§229.7 Prohibited Acts.

(a) The Locomotive Inspection Act (45 U.S.C. 22-34) makes it unlawful for any carrier to use or permit to be used on its line any locomotive unless the entire locomotive and its appurtenances --

(1) Are in proper condition and safe to operate in the service to which they are put, without unnecessary peril to life or limb; and

(2) Have been inspected and tested as required by this part.

(b) Any person (an entity of any type covered under 1 U.S.C. 1, including but not limited to the following: a railroad; a manager, supervisor, official, or other employee or agent of a railroad; any owner, manufacturer, lessor, or lessee of railroad equipment, track, or facilities; any independent contractor providing goods or services to a railroad; and any employee of such owner, manufacturer, lessor, lessee, or independent contractor) who violates any requirement of this part or of the Locomotive Inspection Act or causes the violation of any such requirement is subject to a civil penalty of at least \$500 and

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not more than \$11,000 per violation, except that: Penalties may be assessed against individuals only for willful violations, and, where a grossly negligent violation or a pattern of repeated violations has created an imminent hazard of death or injury to persons, or has caused death or injury, a penalty not to exceed \$22,000 per violation may be assessed. Each day a violation continues shall constitute a separate offense. See appendix B to this part for a statement of agency civil penalty policy.

Guidance:

Paragraph (a) of this section is the regulatory codification of the general statutory language previously contained in the Locomotive Inspection Act, recodified at 49 U.S.C. § 20701. This section should only be cited when defective conditions of a locomotive's appurtenances are disclosed on items not specifically covered by other provisions contained in Part 229. For example, this provision should be used to report a defective appurtenance such as a warning bell or alerter equipment. Defective equipment associated with remote control locomotive (RCL) operations should be addressed under this section. The remote control transmitter (RCT), when operating a locomotive in remote mode, becomes an appurtenance to that locomotive and is subject to the provisions of this section. Also, any lights added to an RCL that indicate the locomotive is operating in the remote control mode is an appurtenance. Therefore, if any of the equipment associated with RCL operations is found defective **at any time** during remote mode operation, appropriate enforcement action should be taken.

The Inspector may consider filing a violation under this section if the following is evident:

1. The locomotive is not in safe or proper condition for the service in which it will be placed, and
2. The involved condition endangers the railroad personnel and/or the public by exposing them to unnecessary peril to life or limb.

If an Inspector seeks a violation under this provision, the Inspector must fully describe the defective part or appurtenance and must fully explain how the defective part or appurtenance endangers the safety of the crew and/or the general public. This section should not be cited if the condition or defective appurtenance is specifically addressed in another provision contained in Part 229, the more specific provision should be utilized.

Paragraph (b) of this section recognizes FRA's ability to use individual liability as an enforcement tool in circumstances where a railroad employee willfully allows the use of a locomotive with a non-complying condition covered by this part. Inspectors must exercise care in these circumstances, ensuring that all the concerns and guidelines discussed in Chapter 3 of this Manual and in Appendix A to 49 CFR Part 209 are followed and addressed before pursuing enforcement action against an individual.

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Regulation:

§229.9 Movement of non-complying locomotives.

(a) Except as provided in paragraphs (b), (c) and §229.125(h), a locomotive with one or more conditions not in compliance with this part may be moved only as a lite locomotive or a dead locomotive after the carrier has complied with the following:

(1) A qualified person shall determine --

(i) That it is safe to move the locomotive; and

(ii) The maximum speed and other restrictions necessary for safely conducting the movement;

(2)(i) The engineer in charge of the movement of the locomotive shall be notified in writing and inform all other crew members in the cab of the presence of the non-complying locomotive and the maximum speed and other restrictions determined under paragraph (a)(1)(ii) of this section.

(ii) A copy of the tag described in paragraph (a)(3) of this section may be used to provide the notification required by paragraph (a)(2)(i) of this section.

(3) A tag bearing the words "non-complying locomotive" and containing the following information, shall be securely attached to the control stand on each MU or control cab locomotive and to the isolation switch or near the engine start switch on every other type of locomotive --

(i) The locomotive number;

(ii) The name of the inspecting carrier;

(iii) The inspection location and date;

(iv) The nature of each defect;

(v) Movement restrictions, if any;

(vi) The destination; and

(vii) The signature of the person making the determinations required by this paragraph.

(b) A locomotive that develops a non-complying condition enroute may continue to utilize its propelling motors, if the requirements of paragraph (a) are otherwise fully met, until the earlier of --

(1) The next calendar day inspection, or

(2) The nearest forward point where the repairs necessary to bring it into compliance can be made.

(c) A non-complying locomotive may be moved lite or dead within a yard, at speeds not in excess of 10 miles per hour, without meeting the requirements of paragraph (a) of this section if the movement is solely for the purpose of repair. The carrier is responsible to insure that the movement may be safely made.

(d) A dead locomotive may not continue in use following a calendar day inspection as a controlling locomotive or at the head of a train or locomotive consist.

(e) A locomotive does not cease to be a locomotive because its propelling motor or

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motors are inoperative or because its control jumper cables are not connected.

(f) Nothing in this section authorizes the movement of a locomotive subject to a Special Notice for Repair unless the movement is made in accordance with the restrictions contained in the Special Notice.

(g) Paragraphs (a), (b), (c) of this section shall not apply to sanitation conditions covered by §§ 229.137 and 229.139. Sections 229.137 and 229.139 set forth specific requirements for the movement and repair of locomotives with defective sanitation compartments.

Guidance:

Section (a): When a non-complying condition under Part 229 is found by either the railroad's Inspector or an MP&E Inspector [*except as provided in paragraphs (b) and (c)*], the railroad may only move the locomotive as a lite locomotive or dead locomotive under whatever conditions that the qualified person and the railroad deem suitable for a safe move [*except as provided in paragraphs (b) and (c)*]. The locomotive may be moved to any location the railroad designates to have it brought into compliance. If the FRA Inspector believes that the movement of the locomotive by the railroad under this section constitutes an immediately unsafe situation, such as possible derailment, a Special Notice For Repairs - FRA Form F6180.8 may be issued to effectively remove the locomotive from service. In addition to describing the immediate unsafe condition, the Inspector must also note that the movement restrictions or lack of (i.e., speed, distance, etc.), as proposed by the railroad, would create an additional unsafe problem. The Inspector should never dictate to a railroad conditions for the movement of any non-complying locomotive, unless the condition is so deplorable that movement at any speed would create an unsafe condition. Any restrictions are the railroad's responsibility.

Section (b) allows for the continued use of a locomotive that develops an en route non-complying condition until the earlier of; (1) the next calendar day inspection, or (2) the nearest forward point where the repairs necessary to bring it into compliance can be made. Use of a locomotive under this provision is permitted only if the requirements of § 229.9(a) are fully met, which means a "non-complying tag" that is properly filled out must be in the cab of the non-complying locomotive.

If the non-complying condition can be brought into compliance by shifting the position of the locomotive in the consist, the non-complying condition should be rectified by doing so at the next forward location where this can be accomplished. This could be a siding, a wye, or any location where it is physically possible to reposition the locomotive. Railroad employees performing this task may do so if it does not endanger the safety of employees, locomotives or train. This location should not be construed or designated as a repair point.

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Section (a)(1) requires that, “A qualified person shall determine - (i) That it is safe to move the locomotive; and (ii) The maximum speed and other restrictions necessary for safely conducting the movement. ”Difficulty in the interpretation and enforcement of Section 229.9 arises as this section does not provide guidance with respect to the criteria used to “qualify” a person to make the determination required above. The decisions to continue use of a non-complying locomotive in some cases are being made by persons not qualified to make these decisions. A person qualified to perform a daily inspection may not necessarily possess the qualifications to make the determination that it is safe to move a defective locomotive.

The qualified person must have demonstrated to the railroad, at a minimum, the knowledge and ability to inspect locomotives and provide recommendations regarding the criteria listed in Section (a). This does not imply that the qualified person must possess intimate knowledge of and experience with all of the components and functions of a locomotive. Additionally, there are varying levels of qualified persons. As an example, a journeyman electrician may not have the necessary knowledge to make safety recommendations concerning locomotive running gear. However, that person should be qualified to address problems associated with the electric control apparatus.

Section 240.123 requires that each railroad provide for initial and continuing education of certified locomotive engineers to ensure that each engineer maintains the knowledge, skills, and ability with respect to (among other areas) the mechanical condition of equipment. As such, the locomotive engineer is considered qualified to provide safety recommendations concerning certain en route non-complying conditions. Normally, these conditions are limited to those which are evaluated during the daily inspection required by Section 229.21 such as headlights, speed indicators, cab seats, air brakes, wiper, and alerter malfunctions. The locomotive engineer would also be expected to identify certain obvious mechanical problems such as major wheel defects and some running gear problems. However, the engineer would not be expected to properly assess the safety implications of continued movement of the locomotive for most mechanical defects. In these cases, recommendations regarding the continued safe movement of a non-complying locomotive in accordance with §229.9(a)(1) need to be made by a person that is more qualified, such as a mechanical department employee. These recommendations may be based on telephone or radio conversations between the engineer and the more qualified individual. If the non-complying condition cannot be resolved solely via voice communication, a qualified individual must conduct a physical on-site inspection to identify all appropriate restrictions for continued safe movement of the locomotive.

While it is the transportation/operating department that controls the daily operation of the railroad, operating personnel may not possess the qualifications and technical expertise to make safety recommendations regarding non-complying locomotives. When investigating an issue involving enforcement of §229.9, MP&E Inspectors must carefully examine the qualifications of the

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individual who made the safety recommendations to determine if the railroad acted in compliance with the regulations.

Certain non-complying conditions require a locomotive to be removed from the lead position at the first available location, but would not require it to be removed from service. Examples of such conditions include, but are not limited to: speed indicators, headlights, cab windows and audible warning devices. When conditions such as these exist, the railroad must, in order to be in compliance, remove the locomotive from the lead position. Inspectors must exercise sound judgement. For example, a defective cab heater during warm weather would not necessitate removal of the locomotive from the lead or controlling position. In the interest of safety, when a locomotive is repositioned from the lead position to correct a non-complying condition, the "non-complying locomotive tag" should remain attached to the locomotive until repairs are made.

Section 229.9 is silent on the repair location question. It depends on the power penalty built into the regulation to convince the railroad to maintain the locomotive fleet. Movement of a lite or dead locomotive not only limits the power available, but adds tonnage to the train.

Where an MP&E Inspector has knowledge that a railroad permits locomotives which develop en route non-complying conditions to continue in service past mechanical facilities where repairs can be made, he/she should investigate to determine that the requirements of Section (a) are being complied with. If the Inspector is made aware that a non-complying locomotive was moved beyond a forward repair location, that has previously demonstrated the ability to effect repairs of the non-complying condition, he or she must ensure that subject locomotive would no longer be used as a propelling or lead locomotive. There is no implication in subsection (b) that each repair location must be capable of repairing all en route non-complying conditions that can occur.

Section 229.9 allows a railroad to move a non-complying locomotive as a lite or dead locomotive to a more distant repair point of its choice, provided it meets all other requirements of §229.9 and such action does not endanger the safety of employees, locomotives or train.

Section 229.9 only permits the movement of a non-complying locomotive with a part 229 defect. Nothing in §229.9 authorizes the movement of a locomotive with power brake or safety appliance defects. Such locomotives can only be moved under provisions of § 20303 of the Act and/or the Power Brake Regulations. **(MP&E 98-50)** It is the responsibility of the railroad to ensure that any locomotive moved with a non-complying defect is in accordance with the applicable law. If there is any doubt, the railroad should contact the FRA. The move may require the railroad to submit for one-time movement authority. (See Chapter 2.)

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Subsection (d) restricts the use of a dead locomotive as a controlling locomotive following a calendar day inspection. If a non-complying condition occurs en route, which renders the locomotive dead, it can continue to control the locomotive consist until a daily inspection is performed. The intent of this restriction is to ensure that crew members are not permitted or required to occupy the cab of a non-complying locomotive over an extended period of time.

Section (e) means that a locomotive is a locomotive at all times and must be in full compliance when in service or tagged as required by Section 229.9 (a).

Regulation:

§229.11 Locomotive Identification.

(a) The letter “F” shall be legibly shown on each side of every locomotive near the end which for identification purposes will be known as the front end.

(b) The locomotive number shall be displayed in clearly legible numbers on each side of each locomotive.

Guidance:

If vandals have painted graffiti on the locomotive and obscured the identification marks, the Inspector should point the defect out to the railroad and use appropriate discretion to gain compliance. Railroad initials do not have to be clearly legible on a locomotive. The regulation does not require railroad initials, only a number.

The “F” is very important in remote control locomotive operations.

Regulation:

§229.13 Control of locomotives.

Except when a locomotive is moved in accordance with §229.9, whenever two or more locomotives are coupled in remote or multiple control, the propulsion system, the sanders, and the power brake system of each locomotive shall respond to control from the cab of the controlling locomotive. If a dynamic brake or regenerative brake system is in use, that portion of the system in use shall respond to control from the cab of the controlling locomotive.

Guidance:

This requirement also applies to controls of distributed power locomotives (DPU) which are controlled from a lead locomotive by either a radio signal, or an electrical signal through a hard

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wire. This also applies when a locomotive consist is operated via remote control, using a belt pack. The belt pack is treated the same as the cab of the controlling locomotive when remote control locomotive operation is in effect.

Regulation:

§229.14 Non-MU locomotive control cab locomotives.

On each non-MU control cab locomotive, only those components added to the passenger car that enable it to serve as a lead locomotive, control the locomotive actually providing tractive power, and otherwise control the movement of the train, are subject to this part.

Guidance:

Only those components added to a passenger car or an “RCL caboose” that make it function as a locomotive, such as the controller, speed indicator, etc., related to controlling speed and braking of a train are subject to this part.

Regulation:

§229.17 Accident reports.

§229.19 Prior Waivers

§229.21 Daily Inspection.

(a) Except for MU locomotives, each locomotive in use shall be inspected at least once during each calendar day. A written report of the inspection shall be made. This report shall contain the name of the carrier; the initials and number of the locomotive; the place, date and time of the inspection; a description of the non-complying conditions disclosed by the inspection; and the signature of the employee making the inspection. Except as provided in §§229.9, 229.137, 229.139, any conditions that constitute non-compliance with any requirement of this part shall be repaired before the locomotive is used. Except with respect to conditions that do not comply with §229.137 or §229.139, a notation shall be made on the report indicating the nature of the repairs that have been made. Repairs made for conditions that do not comply with §229.137 or §229.139 may be noted on the report, or in electronic form. The person making the repairs shall sign the report. The report shall be filed and retained for at least 92 days in the office of the carrier at the terminal at which the locomotive is cared for. A record shall be maintained on each locomotive showing the place, date and time of the previous inspection.

(b) Each MU locomotive in use shall be inspected at least once during each calendar day and a written report of the inspection shall be made. This report may be part of a

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single master report covering an entire group of MU's. If any non-complying conditions are found, a separate, individual report shall be made containing the name of the carrier; the initials and number of the locomotive; the place, date, and time of the inspection; the non-complying conditions found; and the signature of the Inspector. Except as provided in §§229.9, 229.137, 229.139, any conditions that constitute non-compliance with any requirement of this part shall be repaired before the locomotive is used. Except with respect to conditions that do not comply with §229.137 or §229.139, a notation shall be made on the report indicating the nature of the repairs that have been made. Repairs made for conditions that do not comply with §229.137 or §229.139 may be noted on the report, or in electronic form. The person making the repairs shall sign the report. The report shall be filed in the office of the carrier at the place where the inspection is made or at one central location and retained for at least 92 days.

(c) Each carrier shall designate qualified persons to make the inspections required by this section.

Guidance:

The purpose of the calendar day inspection is to ascertain that the locomotive is safe to operate in the service for which it is used, and is in total compliance with Part 229 prior to being placed in service. It is a visual walk-around inspection of the locomotive that provides an opportunity, every day the locomotive is used, to find and correct incipient problems before they lead to an accident or safety incident. An effective locomotive calendar day inspection requires that the individual performing the inspection be alert for telltale signs of any condition or defect that is a potential hazard.

After a daily inspection is performed, the locomotive should be free of any non-complying conditions before it is offered for service. The locomotive cannot legally be used until all federal defects are corrected.

If the Inspector continues to find recurrent defects or a pattern of non-complying conditions at a particular location, he/she should monitor the performance and the results of the daily inspections, as well as question the individual(s) performing the inspections, to ascertain if the individual(s) has the knowledge and ability to perform such inspections.

If daily inspection reports reflect non-complying conditions on a locomotive and the Inspector finds the conditions were not corrected by the railroad and the locomotive continues to be used, violations should be submitted. Such violations should be accompanied by all the documentation available, with a complete explanation regarding the railroad operation at the location.

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Failure to complete, or produce a record or report, in and of itself is not sufficient evidence to establish that a railroad failed to perform an inspection. It is a “records” violation, unless other evidence (i.e.: witness statement, interviews, event recorder downloads, visual observation, etc.) is obtained to establish the failure to conduct the inspection. If the only evidence available merely establishes a failure to complete the cab card or a failure of a railroad to produce a required inspection report, then the appropriate section to cite for civil penalty is §229.21(a)(2) - report not properly executed or retained. Use the “lack of a record and/or report” to **support** the other evidence obtained to establish a “failure to perform an inspection” violation.

Section (a): A daily inspection is required by this section for each day a locomotive is in use. A written report and record are required when the inspection is performed. The inspection can be conducted at any time during the calendar day. It can be done just before midnight or just after midnight. If an inspection were performed just after midnight, the locomotive can be legally used for almost 48 hours before the next inspection is required. An inspection is not needed unless the locomotive is used during the calendar day. Keep in mind that if a locomotive completes an assignment prior to the expiration of the calendar day and is not returned to service for several days, it would need a daily inspection before midnight of the day it is put back into service. This regulation has a number of ambiguities that each Inspector must be aware of when judging the inspection status of any given locomotive.

Sections (a) and (b): The inspection reports are to be filed and retained for 92 days at the terminal where the locomotive is maintained. FRA allows railroads to keep the reports at a central location and waivers have been granted to individual railroads that allow for these reports to be electronically generated and kept. Whether it is a written or electronic report, it must contain the name of the railroad, initial and number of the locomotive, the place date and time of the inspection, a description of any non-complying condition, and the signature of the Inspector. An Inspector has the right to request the reports for a specific locomotive(s) for the past 92 days and the railroad is obligated to provide such reports in a timely manner. A written or electronic record of the previous inspection must be physically kept on each locomotive until the next inspection is performed. The record must contain the place, date, and time of the previous inspection.

FRA has determined that §229.21(a) permits railroads to make either a single written report for each locomotive inspected or a single written report which covers multiple locomotives (usually an entire consist); provided, the report contains the necessary information and is properly retained as indicated below.

When FRA proposed and adopted the locomotive inspection reporting requirements currently contained in §229.21(a), FRA specifically eliminated the previously existing requirement for an approved reporting form. (See 44 FR 29613, May 21, 1979.) When proposing the existing

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reporting requirements, FRA specifically stated that a railroad could adopt any type of written report as long as it included the required information. (See 44 FR 29613.) Consequently, FRA will permit railroads to use a single written report which covers multiple locomotives to meet the written reporting requirements contained in §229.21(a). However, in order to ensure that all of the required information is contained on such reports and to ensure their proper retention, the following conditions must be met if multiple locomotives are addressed on a single daily inspection report:

- Each multiple locomotive daily inspection report provides a space for the initials and number of each locomotive inspected; the place, date and time of the inspection; and the signature of Inspector;
- The inspection report contains a space for entering the initial and number of each non-complying locomotive adjacent to the non-complying condition(s) disclosed by the inspection. There also must be a space to enter the corrective action(s) taken and the signature of person making the repairs;
- A copy of the multiple report is made for each locomotive entered on the report and retained for at least 92 days at a location designated by the railroad;
- A written record is maintained on each locomotive, indicating the date, time and location of the previous calendar day inspection;
- Any condition that constitutes non-compliance with any part of the Locomotive Safety Standards, Part 229, is repaired before the locomotive is used or the locomotive must be tagged and moved in accordance with §229.9.

When performing records inspections, FRA Inspectors should review the railroad's calendar day inspection report procedures. If FRA Inspectors make a request for inspection reports and the railroad is unable to provide a copy for each individual locomotive, appropriate enforcement action should be taken. **(MP&E 00-04)**

Section (c): This section gives the railroad sole prerogative to designate qualified persons to perform the required inspections. FRA has not set forth any qualification standards for the railroad's designated Inspector.

Inspectors should consider issuing a violation report if any of the following questions are answered in the affirmative:

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- Were non-complying conditions previously reported on the calendar day inspection report not repaired?
- Does the railroad have a history of ignoring the requirements of the calendar day inspection regulation?
- Can a violation be documented from railroad records for the use of a locomotive overdue a calendar day inspection?
- Does the overdue inspection create an immediate hazard?

If an Inspector finds a locomotive being used, with multiple, obvious defects after it just received an inspection, a violation can be submitted for both the defective condition(s) and failure to perform a proper inspection.

Remote Control Locomotive -

A locomotive operating as a remote control locomotive (RCL) is given the same daily inspection as a conventional locomotive. The only difference between the two would be the operating controls. If the locomotive is operating in manual mode during the inspection, the brakes would be tested from the controls of the locomotive. If the locomotive is operating in remote mode during the inspection, the brakes would be tested from the remote control transmitter (RCT). Additionally, all features on the RCT would be tested to determine that they are functioning properly.

If the RCL received its daily inspection when the locomotive was operating in the manual mode and later a crew links the RCT to operate the locomotive in remote mode, the transmitter must be tested to determine that it functions as intended prior to commencing remote control operations. No additional reporting is required, with regards to the daily inspection report.

The RCT, when operating the locomotive, becomes an appurtenance to that locomotive and is subject to the provisions of 49 CFR 229.7. Therefore, if an RCT is found defective during the calendar day inspection, it may not be used. Since the transmitter is not permanently mounted to the locomotive, if found defective it can be removed from service and another RCT can be linked to the locomotive after receiving a proper test and inspection.

If the RCL equipment that is permanently mounted to the locomotive becomes defective, the defect and repairs made must be noted on the locomotive daily inspection report. RCT's are portable and are interchangeable. If the transmitter is found defective, it does not affect the locomotive if the locomotive can still be operated in manual or another transmitter can be linked to the RCL. Since the RCT can operate with several locomotives, the defective transmitter need not be reported on the locomotive inspection report. To satisfy the requirement to tag and track defective

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equipment [49 CFR 229.21] the railroad should develop a means to readily identify defective RCT's, record defective conditions, indicate repairs made, person making repairs, and maintain that record for 92 days.

The requirement to maintain the onboard record does not change. If the RCT is inspected and tested as part of the daily inspection, the onboard record is inclusive of this. If the RCT is added to the locomotive some time after the daily inspection, the device must be tested and inspected to insure that the brakes, throttle, and all safety features function as intended. **(MP&E 02-01)**

Regulation:

§229.23 Periodic Inspection: General.

(a) Each locomotive and steam generator shall be inspected at each periodic inspection to determine whether it complies with this part. Except as provided in §229.9, all non-complying conditions shall be repaired before the locomotive or the steam generator is used. Except as provided in §229.33, the interval between any two periodic inspections may not exceed 92 days. Periodic inspections shall only be made where adequate facilities are available. At each periodic inspection, a locomotive shall be positioned so that a person may safely inspect the entire underneath portion of the locomotive.

(b) The periodic inspection of the steam generator may be postponed indefinitely if the water suction pipe to the water pump and the leads to the main switch (steam generator switch) are disconnected, and the train line shut-off-valve is wired closed or a blind gasket applied. However, the steam generator shall be so inspected before it is returned to use.

(c) After April 30, 1980, each new locomotive shall receive an initial periodic inspection before it is used. Except as provided in §229.33, each locomotive in use on or before April 30, 1980, shall receive an initial periodic inspection within 92 days of the last 30-day inspection performed under the prior rules (49 CFR 230.331 and 230.451). At the initial periodic inspection, the date and place of the last tests performed that are the equivalent of the tests required by §§229.27, 229.29, and 229.31 shall be entered on Form FRA F 6180-49A. These dates shall determine when the tests first become due under §§229.27, 229.29, and 229.31. Out of use credit may be carried over from Form FRA F 6180-49 and entered on Form FRA F 6180-49A.

(d) Each periodic inspection shall be recorded on Form FRA F 6180-49A. The form shall be signed by the person conducting the inspection and certified by that person's supervisor that the work was done. The form shall be displayed under a transparent cover in a conspicuous place in the cab of each locomotive.

(e) At the first periodic inspection in each calendar year the carrier shall remove from each locomotive Form FRA F 6180-49A covering the previous calendar year. If a locomotive does not receive its first periodic inspection in a calendar year before April 2 because it is out of use, the form shall be promptly replaced. The Form FRA F 6180-49A covering the preceding year for each locomotive, in or out of use, shall be signed by the railroad official responsible for the locomotive and filed as required in

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§229.23(f). The date and place of the last periodic inspection and the date and place of the last test performed under §§229.27, 229.29, and 229.31 shall be transferred to the replacement Form FRA F6180-49A.

(f) The mechanical officer of each railroad who is in charge of a locomotive shall maintain in his office a secondary record of the information reported on Form FRA F 6180-49A under this part. The secondary record shall be retained until Form FRA F 6180-49A has been removed from the locomotive and filed in the railroad office of the mechanical officer in charge of the locomotive. If the Form FRA F 6180-49A removed from the locomotive is not clearly legible, the secondary record shall be retained until the Form FRA F 6180-49A for the succeeding year is filed. The Form F 6180-49A removed from a locomotive shall be retained until the Form FRA F 6180-49A for the succeeding year is filed.

Guidance:

Section (a): The 92-day cycle begins (day 1) on the date entered on Form F 6180.49A. The 92-day cycle ends 11:59 p.m. on day 92, unless there is legitimate out-of-service time as defined in §229.33. Some Class 1 railroads are performing inspections and reporting them on the F6180.49A report at intervals shorter than 92 days. The FRA takes no exception to this practice but the Inspector should take sufficient time to examine the report to determine that all tests have been performed within the required time periods. "Adequate facilities" is deliberately not spelled out in the regulation. The regulation does not mandate that a pit is required, but it must be possible to thoroughly inspect the underneath portion of the locomotive safely. This allows small shortline railroads, which may not have a pit, the flexibility to place or arrange a locomotive in some position or location so that a person can safely inspect under the locomotive.

Section (b): This section, for all practical purposes, is obsolete given that all of the passenger trains used by Amtrak and the commuter railroads use head end electric power for heating their trains. There may be some steam generators in use on the trains used on some seasonal tourist or historical operations.

Section (d): The F6180.49A form must be signed by the worker performing the inspection and the supervisor in charge of the workers. A signature is required. On some small railroad operations, the owner, supervisor, and worker may be one individual. Therefore, one individual would sign as the worker and the supervisor.

Some railroads have gone to a computer-generated F 6180.49A form which is replaced at each periodic inspection. This form must bear the original signatures of the personnel involved with the most recent inspection and tests. The computer-generated form and the form used at intervals of less than 92 days will require Inspectors to spend more time to determine if the locomotive is in compliance with time elements in §§ 229.23, 229.25 and § 229.27.

If an Inspector finds locomotives without a F6180.49A form displayed in the locomotive cab, he/she shall make inquiry of the railroad as to the reason. If the Inspector is satisfied with the

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railroad's back-up records and the form was lost or destroyed, the railroad is allowed to fax a copy of the form to be placed on the locomotive. The faxed copy would have to be legible, with all pertinent information and signatures.

Section (f): Unless requested, a railroad does not have to forward an F 6180.49A form to the Washington, DC Office of Safety Assurance and Compliance..

Periodic Inspections - Locomotives that operate outside of the United States

With the increase of railroad traffic at both the U.S./Canadian and the U.S./Mexican borders, Inspectors should be governed by the following information relative to required daily and periodic inspections and tests for locomotives.

Locomotives that operate outside of the United States are governed by the laws of the country where they operate. Neither Canada nor Mexico require the types of inspections that are commensurate with the tests and inspections described in 49 CFR Sections 229.21, 229.23, 229.25, 229.27 and 229.29. However, the FRA requires that all locomotives that operate in the United States must be in full compliance with Federal Laws and Regulations.

Therefore, FRA requires that all locomotives entering the United States from either Canada or Mexico must not be used until all the tests and inspections required by Section 229.21, et al., have been completed and properly recorded. Those inspections and tests must be done either at the point of entry into the United States, or arranged to be done within Canada or Mexico prior to entry into this country. If the inspections and tests are not properly performed and/or the locomotive is not in compliance with FRA regulations upon entry into the United States, the locomotive may be moved only under the provisions of Section 229.9 as a dead or lite locomotive. **(MP&E 98-37)**

Regulation:

§229.25 Tests: Every Periodic Inspection.

Each periodic inspection shall include the following:

- (a) All mechanical gauges used by the engineer to aid in the control or braking of the train or locomotive, except load meters used in conjunction with an auxiliary brake system, shall be tested by comparison with a dead-weight tester or a test gauge designed for this purpose.
- (b) All electrical devices and visible insulation shall be inspected.
- (c) All cable connections between locomotives and jumpers that are designed to carry 600 volts or more shall be thoroughly cleaned, inspected, and tested for continuity.
- (d) Each steam generator that is not isolated as prescribed in §229.23(b) shall be inspected and tested as follows:
 - (1) All automatic controls, alarms and protective devices shall be inspected and tested.
 - (2) Steam pressure gauges shall be tested by comparison with a dead-weight tester or a test gauge designed for this purpose. The siphons to the steam gauges shall be

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removed and their connections examined to determine that they are open.

(3) Safety valves shall be set and tested under steam after the steam pressure gauge is tested.

(e) Event Recorder. A microprocessor-based self-monitoring event recorder, if installed, is exempt from periodic inspection under paragraphs (e)(1) through (e)(5) of this section and shall be inspected annually as required by § 229.27(d). Other types of event recorders, if installed, shall be inspected, maintained, and tested in accordance with instructions of the manufacturer, supplier, or owner thereof and in accordance with the following criteria:

(1) A written or electronic copy of the instructions in use shall be kept at the point where the work is performed and a hard-copy version, written in the English language, shall be made available upon request of a governmental agent empowered to request it.

(2) The event recorder shall be tested before any maintenance work is performed on it. At a minimum, the event recorder test shall include cycling, as practicable, all required recording elements and determining the full range of each element by reading out recorded data.

(3) If the pre-maintenance test does not reveal that the device is recording all the specified data and that all recordings are within the designed recording elements, this fact shall be noted, and maintenance and testing shall be performed as necessary until a subsequent test is successful.

(4) When a successful test is accomplished, a copy of the data-verification results shall be maintained in any medium with the maintenance records for the locomotive until the next one is filed.

(5) A railroad's event recorder periodic maintenance shall be considered effective if 90 percent of the recorders on locomotives inbound for periodic inspection in any given calendar month are still fully functional; maintenance practices and test intervals shall be adjusted as necessary to yield effective periodic maintenance.

Guidance:

Section (a): Many railroads use a portable air gauge test device which allows testing without removal of the gauges. The use of such a device is acceptable as long as the gauge is tested throughout its entire range. The brake pipe airflow meter is included in this Section. These requirements do not apply to electronic displays, as they are checked annually.

Section (b): Sufficient inspection covers are to be removed from traction motors, traction generators and electrical cabinets in order to thoroughly inspect such equipment for general safety conditions and safety defects.

Section (e): Inspectors are advised to inquire about and monitor the periodic inspection, maintenance practices and test intervals utilized by the railroads for event recorders when performing routine inspections at locomotive facilities. **(MP&E 98-2)**

- Requires replacement, by October 1, 2009, of each event recorder utilizing magnetic tape as a storage medium with a certified crashworthy event recorder memory module (ERMM) capable of recording at least the same data elements as the recorder it replaces. Any magnetic tape

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recorder replaced after October 1, 2005, must be replaced with a certified crashworthy event recorder memory module.

- Requires all new lead locomotives, lead manned helper locomotives, and controlling distributive power locomotives (ordered after October 1, 2006 or placed in service after October 1, 2009) to be equipped with a certified crashworthy ERMM capable of recording up to 25 data elements for traditional locomotives and 22 data elements for MU and DMU locomotives.
- Requires all remanufactured locomotives after October 1, 2007 to be equipped with a certified crashworthy ERMM capable of recording at least the same data elements as the event recorder on that locomotive prior to remanufacture.
- Requires event recorders originally manufactured after January 1, 2010, and installed on a covered locomotive to be equipped with a certified crashworthy ERMM.
- Contains specific performance criteria for determining the crashworthiness of an ERMM. These include criteria for fire, impact shock, static crush, fluid immersion, and hydrostatic pressure and contains testing sequence requirements. The criteria are based on existing crashworthiness standards of the Institute of Electrical and Electronics Engineers, Inc. (IEEE), modified for the locomotive environment.
- Requires preservation of event recorder data for a period of one year for any locomotive involved in an accident or incident required to be reported to FRA under part 225.
- Provides relief from the periodic inspection requirements for micro-processor based event recorders with self-monitoring features. Requires inspection of these types of event recorders annually.

Regulation:

§229.27 Annual tests.

A locomotive, except for a DMU or MU locomotive, shall be subjected to the tests and inspections prescribed in paragraphs (a), (b), and (c) of this section. A DMU locomotive and an MU locomotive shall be subjected to the tests and inspections prescribed in paragraphs (b) and (c) of this section. A locomotive, including a DMU locomotive and an MU locomotive, equipped with a microprocessor-based event recorder that includes a self-monitoring feature, shall be subjected to the tests and inspections prescribed in paragraph (d) of this section, at intervals that do not exceed 368 calendar days.

(a)(1) The filtering devices or dirt collectors located in the main reservoir supply line to the air brake system shall be cleaned, repaired, or replaced.

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(2) Brake cylinder relay valve portions, main reservoir safety valves, brake pipe vent valve portions, feed and reducing valve portions in the air brake system (including related dirt collectors and filters) shall be cleaned, repaired, and tested.

(3) The date and place of the cleaning, repairing, and testing shall be recorded on Form FRA F 6180-49A and the person performing the work and that person's supervisor shall sign the form. A record of the parts of the air brake system that are cleaned, repaired, and tested shall be kept in the carrier's files or in the cab of the locomotive.

(4) At its option, a carrier may fragment the work required by this paragraph. In that event, a separate air record shall be maintained under a transparent cover in the cab. The air record shall include the locomotive number, a list of the air brake components, and the date and place of the last inspection and test of each component. The signature of the person performing the work and the signature of that person's supervisor shall be included for each component. A duplicate record shall be maintained in the carrier's files.

(b) The load meter shall be tested. Each device used by the engineer to aid in the control or braking of the train or locomotive that provides an indication of air pressure electronically shall be tested by comparison with a test gauge or self-test designed for this purpose. An error of greater than five percent or three pounds per square inch shall be corrected. The date and place of the test shall be recorded on Form FRA F 6180-49A and the person conducting the test and that person's supervisor shall sign the form.

(c) Each steam generator that is not isolated as prescribed in §229.23(b), shall be subjected to a hydrostatic pressure at least 25 percent above the working pressure and the visual return water-flow indicator shall be removed and inspected.

(d) A microprocessor-based event recorder with a self-monitoring feature equipped to verify that all data elements required by this part are recorded, requires further maintenance only if either or both of the following conditions exist:

(1) The self-monitoring feature displays an indication of a failure. If a failure is displayed, further maintenance and testing must be performed until a subsequent test is successful. When a successful test is accomplished, a record, in any medium, shall be made of that fact and of any maintenance work necessary to achieve the successful result. This record shall be available at the location where the locomotive is maintained until a record of a subsequent successful test is filed.

(2) A download of the event recorder, taken within the preceding 30 days and reviewed for the previous 48 hours of locomotive operation, reveals a failure to record a regularly recurring data element or reveals that any required data element is not representative of the actual operations of the locomotive during this time period. If the review is not successful, further maintenance and testing shall be performed until a subsequent test is successful. When a successful test is accomplished, a record, in any medium, shall be made of that fact and of any maintenance work necessary to achieve the successful result. This record shall be kept at the location where the locomotive is maintained until a record of a subsequent successful test is filed. The download shall be taken from information stored in the certified crashworthy crash hardened event recorder memory module if the locomotive is so equipped.

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Guidance:

Section (a): The MU locomotives are only required to comply with sections (b) and (c) if so equipped.

Locomotives equipped with 26-L type brake equipment qualify for an industry-wide waiver (H80-7) that has been in effect since 1985, which extends the time requirement for §229.27(a)(2) and §229.29(a) to 1,104 days. In 2005, the industry was granted another waiver that extends the time requirement to 1,472 days for locomotives equipped with 26-L type brake equipment **and** a functioning air dryer. Under this waiver, the air dryer must be maintained and all air brake filtering devices must be cleaned or replaced annually. See waiver 2005-21325.

Note: All other provisions of §229.27 are performed on a 368-day cycle. Therefore, main reservoir filtering devices or dirt collectors in the supply line shall be cleaned, repaired, or replaced on an annual cycle. Form FRA 6180-49A should indicate the waiver the locomotive is operating under.

The following components should receive attention on the 1,104-day or 1,472-day cycle:

26-C Brake Valve	MU-2A Valves
SA-26 Ind. Brake Valve	26-D & 26-F Control Valve
F-1 Selector Valve	J Type Relay Valve
A-1 CCOP Valve	# 8 or KM Vent Valves
BP Strainer	MR Safety Valves
Foot Valve	MR Check Valves
Double Check Valves	Magnet Valves
H Type Relayair Valves	Reducing Valves
P-2-A Brake Application Valve	

The 30-CDW Console Mounted Brake Valve is considered to be the same as the 26-C and SA-26 brake valve..

Any other deviations in the brake valve, control valve, relay valve or brake application valve exclude the entire equipment from the extension. For example, if there is a distributing valve in the system, the locomotive do not qualify for either the 1,104 or 1,472- day extension. Remote Control Locomotive brake valves added to 26L type brake equipment are not part of the general industry-wide waivers and have to be inspected accordingly.

Locomotives equipped with either the EPIC or CCB electronic brake system have been granted waivers that extend the time requirement to a five-year cycle. However, these waivers are conditional and require that all of the filtering devices be cleaned, repaired, or replaced and the brake pipe vent valve be inspected, cleaned, repaired, and tested on a 368 calendar day interval.

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Recently, another test waiver was granted to the AAR to extend the time requirement beyond the five year period. Please be governed by the 49A - Blue Card.

Section (a)(4): Any railroad that implements a fragmented system of maintaining its air brake equipment on locomotives must have a card or documentation in the cab of the locomotive that lists the various valves and cleaning dates. The card can be very confusing when the Inspector is attempting to determine if the various components are in date, and sufficient time should be allocated in order to make this determination.

Section (b): Displays that provide an indication of air pressure electronically shall be tested.

Indicators used as load meters are required to be tested. Often there are questions pertaining to the requirement for testing load meters on locomotives equipped with AC traction motors, which use a computer screen to display loading information. Since an analog load meter indicating the current or amperage being applied to the traction motors is not included or required on the AC locomotive control stand, the regulation **does not apply**. The information provided to an engineer operating an AC locomotive is the electric power output, as indicated by tractive effort in pounds. In many cases, a bar graph displays the tractive effort as a percentage of the locomotive's total output.

The direct current traction motor analog load meter indicates short time high amperage zones, which alerts the engineer to possible overheating of the traction motor. The AC traction motor has no commutator or brushes, thus full current can be applied without damage because the computers automatically control loading at proper levels to prevent motor damage. **(MP&E 98-54)**

Regulation:

§229.29 Biennial tests.

(a) Except for the valves and valve portions on non-MU locomotives that are cleaned, repaired, and tested as prescribed in §229.27(a), all valves, valve portions, MU locomotive brake cylinders and electric-pneumatic master controllers in the air brake system (including related dirt collectors and filters) shall be cleaned, repaired, and tested at intervals that do not exceed 736 calendar days. The date and place of the cleaning, repairing, and testing shall be recorded on Form FRA F 6180-49A, and the person performing the work and that person's supervisor shall sign the form. A record of the parts of the air brake system that are cleaned, repaired, and tested shall be kept in the carrier's files or in the cab of the locomotive.

(b) At its option, a carrier may fragment the work required by this section. In that event, a separate air record shall be maintained under a transparent cover in the cab. The air record shall include the locomotive number, a list of the air brake components, and the date and place of the inspection and test of each component. The signature of the person performing the work and the signature of that person's supervisor shall be included for each component. A duplicate record shall be maintained in the carrier's files.

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Guidance:

Section (a): This section refers to all other valves in the air brake system. As noted in the guidance for §229.27, a waiver was granted in 1985 which allows any locomotive with a 26-L type air brake system to go a total of 1,104 days between the required cleaning, repairing, and testing. Locomotives equipped with either the EPIC or CCB electronic brake system have been granted conditional waivers that extend the time requirement for cleaning, repairing, and testing valves and valve portions to a five-year cycle.

When Part 229 was promulgated, MU locomotives were subject to a two-year inspection interval and this was not changed until the Passenger Equipment Safety Standards were written. It is still 736 days, except as provided in § 238.309(b)(2) “Every 1,104 days if the MU locomotive is part of a fleet that is 100 percent equipped with air dryers and is equipped with PS-68, 26-C, 26-L, PS-90, CS-1, RT-2, RT-5A, GRB-1, CS-2, or 26-R brake systems.”

Section (b): See Guidance for Section 229.27(a)(4) above, regarding the fragmentation of brake work.

Recently, another test waiver was granted to the AAR to extend the time requirement beyond the five year period. Please be governed by the 49A - Blue Card.

Regulation:

§229.31 Main reservoir tests.

(a) Except as provided in paragraph (c) of this section, before it is put in service and at intervals that do not exceed 736 calendar days, each main reservoir other than an aluminum reservoir shall be subjected to a hydrostatic pressure of at least 25 percent more than the maximum working pressure fixed by the chief mechanical officer. The test date, place, and pressure shall be recorded on Form FRA F 6180-49A, and the person performing the test and that person's supervisor shall sign the form.

(b) Except as provided in paragraph (c) of this section, each main reservoir other than an aluminum reservoir shall be hammer tested over its entire surface while the reservoir is empty at intervals that do not exceed 736 calendar days. The test date and place shall be recorded on Form FRA F 6180-49A, and the person performing the test and that person's supervisor shall sign the form.

(c) Each welded main reservoir originally constructed to withstand at least five times the maximum working pressure fixed by the chief mechanical officer may be drilled over its entire surface with telltale holes that are three-sixteenths of an inch in diameter. The holes shall be spaced not more than 12 inches apart, measured both longitudinally and circumferentially, and drilled from the outer surface to an extreme depth by the formula displayed in the current 49 CFR Part 229. One row of holes shall be drilled lengthwise of the reservoir on a line intersecting the drain opening. A reservoir so drilled does not have to meet the requirements of paragraphs (a) and (b) of this

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section, except the requirement for a hydrostatic test before it is placed in use. Whenever any such telltale hole shall have penetrated the interior of any reservoir, the reservoir shall be permanently withdrawn from service. A reservoir now in use may be drilled in lieu of the tests provided for by paragraphs (a) and (b) of this section, but it shall receive a hydrostatic test before it is returned to use.

(d) Each aluminum main reservoir before being placed in use and at intervals that do not exceed 736 calendar days thereafter, shall be --

(1) Cleaned and given a thorough visual inspection of all internal and external surfaces for evidence of defects or deterioration; and

(2) Subjected to a hydrostatic pressure at least twice the maximum working pressure fixed by the chief mechanical officer, but not less than 250 psi. The test date, place, and pressure shall be recorded on Form FRA F 6180-49A, and the person conducting the test and that person's supervisor shall sign the form.

Guidance:

Section (c) the word "drilled" is to be inserted in the Hammer and Hydro block on the FRA form F 6180.49A. The exterior of the drilled reservoirs are to be examined for their general condition.

Regulation:

§229.33 Out-of-use-credit.

When a locomotive is out of use for 30 or more consecutive days or is out of use when it is due for any test or inspection required by §229.23, 229.25, 229.27, 229.29, or 229.31, an "out-of-use" notation showing the number of out-of-use days shall be made on an inspection line on Form FRA F6180-49A. A supervisory employee of the carrier who is responsible for the locomotive shall attest to the notation. If the locomotive is out of use for one or more periods of at least 30 consecutive days each, the interval prescribed for any test or inspection under this part may be extended by the number of days in each period the locomotive is out of use since the last test or inspection in question. A movement made in accordance with §229.9 is not a use for purposes of determining the period of the out-of-use credit.

Guidance:

The out-of-use credit inserted on an inspection line of the F 6180.49A form accounts for the continuous record of a locomotive's use for a calendar year. These random days cannot be accumulated nor used to extend the intervals prescribed for any test or inspection under this part, unless the time period is for 30 or more consecutive days. The creditable out-of-use time of 30 or more days, that is used to extend the test or inspection intervals, must be recorded in block number 11 on the Form F 6180.49A when a new form is created. Once the credit is used, it should be deleted from the form.

If a railroad leases a locomotive to a private industry and it is used entirely within the confines of a plant which is not a part of the general railroad system, the locomotive cannot be credited as out-of-use time because the locomotive is being used. When the railroad has a leased locomotive

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returned, the railroad must bring it into compliance with all of Part 229 before it can be used in general railroad service.

Regulation:

§229.41 Protection against personal injury.

Fan openings, exposed gears and pinions, exposed moving parts of mechanisms, pipes carrying hot gases and high-voltage equipment, switches, circuit breakers, contactors, relays, grid resistors, and fuses shall be in non-hazardous locations or equipped with guards to prevent personal injury.

Guidance:

The requirements of this section are designed to protect against safety hazards that could cause personal injuries.

Regulation:

§229.43 Exhaust and battery gases.

(a) Products of combustion shall be released entirely outside the cab and other compartments. Exhaust stacks shall be of sufficient height or other means provided to prevent entry of products of combustion into the cab or other compartments under usual operating conditions.

(b) Battery containers shall be vented and batteries kept from gassing excessively.

Guidance:

Section (a): The exhaust system of a locomotive should be inspected closely while the diesel engine is running for cracks in the manifolds and expansion bellows, broken or blown out manifold gaskets, and other signs of exhaust gas discharge into the engine compartment as evidenced by heavy accumulations of soot and residue. The lay shaft should not be operated by Inspectors to accelerate the diesel engine to check for exhaust leaks. If there is evidence of an exhaust leak, the railroad should be requested to operate the lay shaft or rev the engine to locate the leak. Instances have been mentioned by some railroads in which Inspectors have reported exhaust leaks and railroad Inspectors could not find them. Since the advent of the EMD GP-30 and its successors and the GE U-25-B and its successors, the locomotive diesel engine compartments are pressurized to the extent that any residual fumes in the car body will be scavenged to the atmosphere around the exhaust stack opening in the roof.

Regulation:

§229.45 General Conditions.

All systems and components on a locomotive shall be free of conditions that endanger the safety of the crew, locomotive or train. These conditions include: insecure attachment of components, including third rail shoes or beams, traction motors and motor gear cases, and fuel tanks; fuel, oil, water, steam, and other leaks and accumulations of oil on electrical equipment that create a personal injury hazard; improper functioning of

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components, including slack adjusters, pantograph operating cylinders, circuit breakers, contactors, relays, switches, and fuses; and cracks, breaks, excessive wear and other structural infirmities of components, including quill drives, axles, gears, pinions, pantograph shoes and horns, third rail beams, traction motor gear cases, and fuel tanks.

Guidance:

This regulation is basically a compendium of many regulations found in the former Part 230. When this regulation was written, the railroads were concerned that the provisions of this regulation created a degree of discretion in interpretation and application by the MP&E Inspectors. FRA's position is that its Inspectors have always interpreted the regulations in Part 230 in a reasonable manner. FRA also believes that, "conditions that endanger the safety of the crew, locomotive, or train" provides the proper and lawful limit to the application of this section.

Conditions described as fuel, oil, water, steam, and other leaks must be qualified by stating that they constitute a personal injury hazard. Insecure attachments of those items such as third rail shoes or beams, traction motors and motor gear cases and fuel tanks should have some relevancy to safety, or have deteriorated to the point that it is immediately unsafe and could cause an accident. A locomotive should not be cited for conditions described above if they do not constitute a hazard of any type, but are merely technical in nature. However, the railroad should be required to correct the condition and bring the locomotive into compliance. Any Safety Appliances not covered in Part 231, such as steps and handholds that aid in sanding locomotives, and safety railings, ladder treads affording access to the roof of the locomotive are covered by this section. Similarly, if the sander hose or pipe has a hole in it which discharges sand at eye level, the Inspector must establish the personal injury hazard under 229.45. The Inspector must explain how the blowing would cause the injury (i.e. sand blowing at eye level on locomotive walkway, etc.). Inspectors should use this code if when they find a handle missing or the locking feature defective on locomotive air brake MU end-cocks, since these conditions may affect the operation of the locomotive's brakes.

When a violation is submitted for any of the conditions described in this section, the personal injury hazard should be described to include a full explanation of the condition and how it creates a personal hazard.

Regulation:

§229.46 Brakes: General.

The carrier shall know before each trip that the locomotive brakes and devices for regulating all pressures, including but not limited to the automatic and independent brake valves, operate as intended and that the water and oil have been drained from the air brake system.

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Guidance:

The Inspector should observe railroad personnel performing the required airbrake test on a locomotive(s).

Inspectors should check that someone, *before the start of the trip*, drained the oil and water from the air brake system. FRA considers the *trip* in “yard operations” to be the start of the shift. The mere presence of water or oil in the in the brake system in and of itself does not establish a violation under this section. Nor does the fact that there is oil or water in the system following a daily inspection establish a violation. In order to establish a violation we must prove that the water and oil was not drained from the system before the trip (for which the violation is being sought) began. Thus, if oil or water are present the Inspector should discuss why the presence of such could not have occurred while the locomotive was en route on its trip (length of trip v. amount of oil and water). The mere fact that a daily inspection was performed does not establish a violation under this section. FRA must establish that the oil or water was not drained prior to the commencement of the involved trip.

Most of the road locomotives are equipped with some type of automatic main air reservoir drain valve to drain the water and oil from the air brake system. Usually when the automatic drain valve is cut out or inoperative, water and oil will accumulate in the reservoir. In this case, Inspectors should take exception to an inoperative (defective or nullified) automatic drain valve. If the automatic drain valve is found to be inoperative or nullified, but no water or oil is present in the reservoir, a non-complying condition **does not** exist under this section. Since it is an appurtenance to the locomotive, §229.7 could be used for enforcement.

Regulation:

§229.47 Emergency brake valve.

(a) Except for locomotives with cabs designed for occupancy by only one person, each road locomotive shall be equipped with a brake pipe valve that is accessible to a member of the crew, other than the engineer, from that crew member's position in the cab. On car body type locomotives, a brake pipe valve shall be attached to the wall adjacent to each end exit door. The words "Emergency Brake Valve" shall be legibly stenciled or marked near each brake pipe valve or shall be shown on an adjacent badge plate.

(b) MU and control cab locomotives operated in road service shall be equipped with an emergency brake valve that is accessible to another crew member in the passenger compartment or vestibule. The words "Emergency Brake Valve" shall be legibly stenciled or marked near each valve or shall be shown on an adjacent badge plate.

Guidance:

Section (a): The emergency brake valve may be found in various locations on different locomotives. There is no precise location except that it must be readily **accessible** to someone other than the engineer, and on locomotives with enclosed walkways there must be an additional valve adjacent to rear exit doors. Although the requirement does not address location of the valve within the cab,

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the required stenciling near each valve must be visible. If a valve is located behind a cab seat where a crew member must fold the seat down in order to activate it, the required stenciling must not be obstructed. The required stenciling must be visible to identify the valve's location.

Section (b): The emergency brake valve must be located in the passenger compartment and must be connected to the brake pipe.

Good enforcement discretion should be used if the "Emergency Brake Valve" designation is found not intact. The condition should be brought to the railroad's attention for correction. The Inspector should periodically have the railroad test the emergency valve on the locomotive on a random basis to insure proper operation.

Regulation:

§229.49 Main reservoir system.

(a)(1) The main reservoir system of each locomotive shall be equipped with at least one safety valve that shall prevent an accumulation of pressure of more than 15 pounds per square inch above the maximum working air pressure fixed by the chief mechanical officer of the carrier operating the locomotive.

(2) Except for non-equipped MU locomotives built prior to January 1, 1981, each locomotive that has a pneumatically actuated system of power controls shall be equipped with a separate reservoir of air under pressure to be used for operating those power controls. The reservoir shall be provided with means to automatically prevent the loss of pressure in the event of a failure of main air pressure, have storage capacity for not less than three complete operating cycles of control equipment and be located where it is not exposed to damage.

(b) A governor shall be provided that stops and starts or unloads and loads the air compressor within 5 pounds per square inch above or below the maximum working air pressure fixed by the carrier.

(c) Each compressor governor used in connection with the automatic air brake system shall be adjusted so that the compressor will start when the main reservoir pressure is not less than 15 pounds per square inch above the maximum brake pipe pressure fixed by the carrier and will not stop the compressor until the reservoir pressure has increased at least 10 pounds.

Guidance:

The Inspector should periodically have the railroad demonstrate the functioning and setting of the safety valve and compressor governor at locations where periodic inspections are performed.

UPRR requested and was granted a conditional waiver to permit UPRR locomotive main reservoir system safety valve to accumulate up to 25 psi above the maximum working air pressure fixed by the chief mechanical officer, the maximum allowed by regulation is 15 psi. This waiver was assigned docket number "FRA-2005-21179" a copy of the decision letter is available in the MP&E Waiver section of this Compliance Manual.

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Regulation:

§229.51 Aluminum main reservoirs.

(a) Aluminum main reservoirs used on locomotives shall be designed and fabricated as follows:

(1) The heads and shell shall be made of Aluminum Association Alloy No. 5083-0, produced in accordance with American Society of Mechanical Engineers (ASME) Specification SB-209, as defined in the "ASME Boiler and Pressure Vessel Code" (1971 edition), section II, Part B, page 123, with a minimum tensile strength of 40,000 p.s.i. (40 k.s.i.).

(2) Each aluminum main reservoir shall be designed and fabricated in accordance with the "ASME Boiler and Pressure Vessel Code," section VIII, Division I (1971 edition), except as otherwise provided in this part.

(3) An aluminum main reservoir shall be constructed to withstand at least five times its maximum working pressure or 800 p.s.i., whichever is greater.

(4) Each aluminum main reservoir shall have at least two inspection openings to permit complete circumferential visual observation of the interior surface. On reservoirs less than 18 inches in diameter, the size of each inspection opening shall be at least that of 1½-inch threaded iron pipe, and on reservoirs 18 or more inches in diameter, the size of each opening shall be at least that of 2-inch threaded iron pipe.

(b) The following publications, which contain the industry standards incorporated by reference in paragraph (a) of this section, may be obtained from the publishers and are also on file in the Office of Safety of the Federal Railroad Administration, Washington, DC 20590. Sections II and VIII of the "ASME Boiler and Pressure Vessel Code" (1971 edition) are published by the American Society of Mechanical Engineers, United Engineering Center, 345 East 47th Street, New York, NY 10017.

Guidance:

Currently, aluminum main air reservoirs are not in use. This section is included in the regulation to provide design guidance. If an Inspector finds an aluminum air reservoir, the regional office should be immediately notified and the information forwarded to the MP&E Staff Director.

Regulation:

§229.53 Brake gauges.

All mechanical gauges and all devices providing indication of air pressure electronically that are used by the engineer to aid in the control or braking of the train or locomotive shall be located so that they may be conveniently read from the engineer's usual position during operation of the locomotive. A gauge or device shall not be more than five percent or three pounds per square inch in error, whichever is less.

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Guidance:

The regulation pertains only to gauges and displays used by the engineer for controlling or braking a train or locomotive pneumatically. All other air gauges located at other locations on a locomotive are not included. Gauges and preset pressure devices on the belt packs used in remote control locomotive operations are subject to this section.

Regulation:

§229.55 Piston Travel.

- (a) Brake cylinder piston travel shall be sufficient to provide brake shoe clearance when the brakes are released.
- (b) When the brakes are applied on a standing locomotive, the brake cylinder piston travel may not exceed 1½ inches less than the total possible piston travel. The total possible piston travel for each locomotive shall be entered on Form FRA F 6180-49A.
- (c) The minimum brake cylinder pressure shall be 30 pounds per square inch.

Guidance:

Section (b): The requirements are that the piston travel not exceed 1½ inches less than the total possible piston travel. This measurement can be found on the locomotive's blue card, FRA F6180-49A. Inspectors should periodically check the 49A card for accurate measurements. On a typical locomotive in service today, the total piston travel for a truck-mounted brake cylinders is 8-inches, therefore the allowable piston travel shall not exceed 6-½ inches. Excessive piston travel of a minor nature and on only one cylinder should not necessarily result in a violation, but the railroad should be requested to repair it. When measuring piston travel on locomotives, the measurement is from the opening of the cylinder to the collar. It is not the grease ring, as is the practice when measuring piston travel on freight cars.

Section (c) regarding the minimum locomotive brake cylinder pressure required by the Federal regulations. These regulations were written when cast iron brake shoes were the standard and the brake cylinder relay air valve delivered 100 percent of the control pressure to the brake cylinders. With the advent of the high friction composition brake shoe, various relay valves have been used depending on whether the rigging was designed for cast iron or composition shoes. To best match the stop distance of cast iron, a two-step relay valve is used for composition shoes. One level is used for the automatic brake where speeds are generally above "switching" speeds and a higher level for the independent brake which is normally used in switching. By tailoring the relay valve to the locomotive, a standard independent brake valve setting can be used universally on a railroad. This setting is usually 45 psi. The resulting brake cylinder pressure may vary 27 psi (with a 60 percent relay) to 72 psi (with a 160 percent relay). The 60 percent relay valves (J-46 or J-64) are normally found on older locomotives which were converted from cast iron shoes with clasp rigging to composition shoes with clasp rigging. Therefore, FRA considers such locomotives to be in compliance with the regulations. **(MP&E 98-41)**

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Regulation:

§229.57 Foundation Brake Gear.

A lever, rod, brake beam, hanger, or pin may not be worn through more than 30 percent of its cross-sectional area, cracked, broken, or missing. All pins shall be secured in place with cotters, split keys, or nuts. Brake shoes shall be fastened with a brake shoe key and aligned in relation to the wheel to prevent localized thermal stress in the edge of the rim or the flange.

Guidance:

When out-of-line (overriding) brake shoes are discovered, the Inspector should try to determine the root cause of the defect (e.g. bushings, hangers, pins, etc.) Also, the wheel should be examined for thermal stress at the edge of the wheel, as evidenced by small thermal cracks, metal flow, or discoloration.

Regulation:

§229.59 Leakage.

(a) Leakage from the main air reservoir and related piping may not exceed an average of 3 pounds per square inch per minute for 3 minutes after the pressure has been reduced to 60 percent of the maximum pressure.

(b) Brake pipe leakage may not exceed 5 pounds per square inch per minute.

(c) With a full service application at maximum brake pipe pressure and with communication to the brake cylinders closed, the brakes shall remain applied at least 5 minutes.

(d) Leakage from control air reservoir, related piping, and pneumatically operated controls may not exceed an average of 3 pounds per square inch per minute for 3 minutes.

Guidance:

Section (a): An air leak from the main air reservoir system cannot be considered non-complying unless it is **in excess of** 3 pounds as described in this section. If the Inspector believes that the leak is excessive, he/she should have the railroad perform the required test procedure.

Section (b): After an automatic brake pipe reduction of at least 20 psi (not to exceed full service) is made, wait 45 - 60 seconds, and if the locomotive is equipped with the means for maintaining brake pipe pressure, this feature must be cut out. Then observe if the brake pipe leakage exceeds 5 psi per minute.

Section (c): Leakage of air observed at a brake cylinder in itself may not be a non-complying condition. A non-complying condition would be present if the brakes did not remain applied for 5 minutes as a result of the leak. This can only be determined after communication from the automatic brake valve is cut off at the completion of a full service application. The railroad should perform the required test for the MP&E Inspector.

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Section (d): This system will only be found on locomotives which utilize air-operated electric power contactors and/or an air-operated throttle.

Regulation:

§229.61 Draft system.

(a) A coupler may not have any of the following conditions:

(1) A distance between the guard arm and the knuckle nose of more than 5C inches on standard type couplers (MCB contour 1904) or more than 5- 5/16 inches on D&E couplers.

(2) A crack or break in the side wall or pin bearing bosses outside of the shaded areas shown in Figure 1 or in the pulling face of the knuckle.

(3) A coupler assembly without anti-creep protection.

(4) Free slack in the coupler or drawbar not absorbed by friction devices or draft gears that exceeds one-half inches.

(5) A broken or cracked coupler carrier.

(6) A broken or cracked yoke.

(7) A broken draft gear.

(b) A device shall be provided under the lower end of all drawbar pins and articulated connection pins to prevent the pin from falling out of place in case of breakage.

Guidance:

Coupler heights and safety appliances should be examined for compliance with the Safety Appliance Standards and all deficiencies should be reported under Part 231. The coupler heights must be measured on level, tangent track. The standard height for locomotive coupler is identical to freight and passenger car: standard gauge railroad center of knuckle shall be a maximum of 34½ inches and a minimum of 31½ inches above the top of the rail.

Section (a)(2): The definition of a crack or break must be applied judiciously used when examining a coupler for such non-complying condition. If the condition observed is a shrinkage crack or a hot tear (a phenomenon that occurs during the casting process), it does not significantly diminish the strength of the coupler, and thus is not considered to be a crack or non-complying condition. For additional information on coupler cracks, see the guidance related to draft systems for freight cars contained in Chapter 4, section 215.123.

Section (a)(3): Most freight-hauling locomotives have a top-operated lock lifter and so long as there is clearance in the operating loop when the knuckle is closed the anti-creep should be functioning.

Section (a)(4): This pertains to all types of locomotives regardless of the service to which they are put. The lost motion or draft system free slack is that which is not absorbed by the draft gear or similar equipment. The free slack can be determined by manually placing the coupler in draft and buff position, scribing a mark at each position on the side of the coupler horn, and then measuring the distance between the two marks.

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Regulation:

§229.63 Lateral motion.

(a) Except as provided in paragraph (b), the total uncontrolled lateral motion between the hubs of the wheels and boxes, between boxes and pedestals or both, on any pair of wheels may not exceed 1 inch on non-powered axles and friction bearing powered axles, or $\frac{3}{4}$ inch on all other powered axles.

(b) The total uncontrolled lateral motion may not exceed 1 $\frac{1}{4}$ inches on the center axle of three-axle trucks.

Guidance:

The "total uncontrolled lateral motion" referred to in this section means the lateral motion provided for in the design of the parts, plus any additional lateral motion due to wear. The Inspector may have to measure at several points of an axle assembly to calculate the total clearance.

Regulation:

§229.64 Plain bearings

A plain bearing box shall contain visible free oil and may not be cracked to the extent that it will leak oil.

Guidance:

Only plain bearing boxes are referenced in this section, and then in a very restrictive manner. Any mechanical defect in the friction bearings, as well as any defects found in a roller bearing assembly shall be reported under section 229.45, "General Conditions." Obvious hazardous conditions found when inspecting either friction or roller bearing not specifically covered by these regulations may be handled by the use of a Special Notice for Repairs, FRA Form F6180.8.

Regulation:

§229.65 Spring rigging.

(a) Protective construction or safety hangers shall be provided to prevent spring planks, spring seats or bolsters from dropping to track structure in event of a hanger or spring failure.

(b) An elliptical spring may not have its top (long) leaf broken or any other three leaves broken, except when that spring is part of a nest of three or more springs and none of the other springs in the nest has its top leaf or any other three leaves broken. An outer coil spring or saddle may not be broken. An equalizer, hanger, bolt, gib, or pin may not be cracked or broken. A coil spring may not be fully compressed when the locomotive is at rest.

(c) A shock absorber may not be broken or leaking clearly formed droplets of oil or other fluid.

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Guidance:

Section (b) This section is restricted in application. Many of the locomotives presently in service using elliptical springs have more than three leaf springs in a nest. A locomotive may have a long leaf broken and up to two other smaller leaves broken, or up to five smaller leaves broken, provided that no other long leaves are broken. The context of the aforementioned guidance applies to elliptical springs that are only part of a nest of three or more. At no time may a locomotive have two long leaves broken.

Also, many locomotives are equipped with rubber/steel laminated pads instead of leaf springs, and where such pads are found to be defective or deteriorated and they create an unsafe condition, they should be reported under Section 229.45.

Only the outer coil spring is addressed in this section. All coil springs in a truck assembly are to be inspected and considered, such as those which are used to support the span bolster on the EMD SD series of locomotives, and must be in compliance with this section. A spring plank resting on or in contact with the safety hanger should be reported.

Section (c) "**Clearly formed droplets**" means a **fresh** accumulation of oil (not dirty or dried) which continually and/or slowly forms into beads. If there is evidence of the unit being ineffective, it is considered defective. This applies to shock absorbers and yaw dampers.

Regulation:

§229.67 Trucks

§229.69 Side Bearings

(a) Friction side bearings with springs designed to carry weight may not have more than 25 percent of the springs in any one nest broken.

(b) Friction side bearings may not be run in contact unless designed to carry weight. Maximum clearance of side bearings may not exceed one-fourth inch on each side or a total of one-half inch on both sides, except where more than two side bearings are used under the same rigid superstructure. The clearance on one pair of side bearings under the same rigid superstructure shall not exceed one-fourth inch on each side or a total of one-half inch on both sides; the other side bearings under the same rigid superstructure may have one-half inch clearance on each side or a total of 1 inch on both sides. These clearances apply where the spread of the side bearings is 50 inches or less; where the spread is greater, the side bearing clearance may only be increased proportionately.

Guidance:

Section (b) Side bearings may not run in contact unless they are designed to carry weight. To determine that there is no clearance between a pair of side bearings which appear to be in contact at both sides, the Inspector must use a thin feeler gauge to make the determination as to whether or not clearance exists.

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There are two measurements allowed on a locomotive which has two trucks under the same structure. A total not to exceed ½ inch is allowed at the side bearings of one truck and under the same superstructure, a total not to exceed 1 inch is allowed on trucks with more than one pair of side bearings per truck. The superstructure is only that part over the trucks. Inspectors must be cognizant of truck configurations that allow for more than one pair of side bearings on one truck. No exception should be taken if all the side bearing clearance is to one side and there is no apparent problem with the locomotive. **All side bearing measurements must be taken on tangent, level track.**

Regulation:

§229.73 Wheel sets.

(a) The variation in the circumference of wheels on the same axle may not exceed 1/4 inch (two tape sizes) when applied or turned.

(b) The maximum variation in the diameter between any two wheel sets in a three-powered-axle truck may not exceed ¾ inch, except that when shims are used at the journal box springs to compensate for wheel diameter variation, the maximum variation may not exceed 1¼ inch. The maximum variation in the diameter between any two wheel sets on different trucks on a locomotive that has three-powered- axle trucks may not exceed 1¼ inch. The diameter of a wheel set is the average diameter of the two wheels on an axle.

(c) On standard gauge locomotives, the distance between the inside gauge of the flanges on non-wide flange wheels may not be less than 53 inches or more than 53½ inches. The distance between the inside gauge of the flanges on wide flange wheels may not be less than 53 inches or more than 53¼ inches.

(d) The distance back to back of flanges of wheels mounted on the same axle shall not vary more than ¼ inch.

Guidance:

Section (b) This section deals with the problem of mismatched wheels which are identified as (1) wheel slip control, (2) traction motor current unbalance and (3) axle load variations.

(1) The wheel slip control system brings into play either manual sanding by the engineer or automatic sanding triggered as the response to arrest the wheel slip. In either case, sanding may substantially increase the ratio of lateral to vertical forces creating a derailment possibility.

(2) Traction motor current unbalance results in different current levels between the motors in the truck which affects the traction motor operating temperature and the distribution of tractive effort.

(3) The axle load variation caused by different wheel sizes affects the adhesion level demand at various axle locations since some axles are called upon to accept more or less of the locomotive's weight than they would with equal wheel sizes. This affects the tracking characteristics of the locomotive. A lightly loaded leading axle of a truck would have a greater tendency to climb the rail

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in a curve or at track irregularities, while a heavily loaded axle has the same effect on the track structure as a heavier locomotive.

Inspectors are advised that this regulation applies only to three powered axle trucks. Inspectors should employ the witness groove method to determine the wheel diameter. To properly measure the diameter of a locomotive wheel, measure the distance from the top of the reference (witness) groove to the outer edge of the rim, multiply by two and add 36 inches. A standard steel wheel gage (finger gage) would normally be used for this measurement. Gauge W319 can also be used to determine a wheel's diameter, especially if 44" wheels are involved.

Regulation:

§229.75 Wheels and tire defects.

Wheels and tires may not have any of the following conditions:

- (a) A single flat spot that is 2½ inches or more in length, or two adjoining spots that are each two or more inches in length.
- (b) A gouge or chip in the flange that is more than 1½ inches in length and ½ inch in width.
- (c) A broken rim, if the tread, measured from the flange at a point five-eighths inch above the tread, is less than 3¾ inches in width.

- (d) A shelled-out spot 2½ inches or more in length, or two adjoining spots that are each two or more inches in length.
- (e) A seam running lengthwise that is within 3¾ inches of the flange.
- (f) A flange worn to a **F** inch thickness or less, gauged at a point 3/8 inch above the tread.
- (g) A tread worn hollow 5/16 inch or more on a locomotive in road service or 3/8 inch or more on a locomotive in switching service.
- (h) A flange height of 1½ inches or more measured from tread to the top of the flange.
- (i) Tires less than 1½ inches thick.
- (j) Rims less than 1 inch thick on a locomotive in road service or less than ¾ inch on a locomotive in yard service.
- (k) A crack or break in the flange, tread, rim, plate, or hub.
- (l) A loose wheel or tire.
- (m) Fusion welding may not be used on tires or steel wheels of locomotives, except for the repair of flat spots and worn flanges on locomotives used exclusively in yard service. A wheel that has been welded is a welded wheel for the life of the wheel.

Guidance:

Great care should be exercised when measuring wheels for flat spots and high flanges. The Inspector should use appropriate wheel gages and not include a measurement along with a non-complying condition, unless the wheel defect in question is so severe that an additional monetary penalty can be established, as reflected in the penalty schedule. Additional guidance on how gages are used to measure wheels can be found in the guidance written for §215.103.

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Section (k) A crack in the wheel will require some judgment on the part of the Inspectors, especially those who regularly inspect MU locomotive equipment or locomotives used in commuter service. Those cracks which are found in discolored wheels which extend from the tread outward over the edge of the rim or into the flange should be considered as dangerous to the safety of the wheel and handled for correction with the railroad. If any crack appears to be opened, it should be reported because the wheel has gone into a state of tension and any further thermal abuse may result in a broken wheel. These cracks are often referred to as thermal cracks, resulting from high speed, short distances, and the heavy braking required in commuter service. The Inspector should be aware of such conditions and bring the issue to the Specialist's attention for evaluation and monitor the situation as required.

Section (m) At the option of the railroad, welding of wheels is permitted to make emergency repairs in order to move a road locomotive from an accident site or a location where a defective wheel cannot be replaced. However, any subsequent move can then only be made as required by Section 229.9, that is, the locomotive cannot be used in service and can only be moved lite or dead-in-tow. It is also permissible to weld wheels on locomotives used only in yard service. Yard is defined by "Yard Limits" which are designated by the railroad and is usually found in the current timetable or established by posted signs. Locomotives with welded wheels can only operate on tracks within the designated limits of a yard and whose movements are governed by Rule 93, of the AAR's Standard Operating Rules. The minimum requirements of "Rule 93" are defined in 49 CFR 218.35.

Regulation:

§229.77 Current collectors.

(a) Pantographs shall be so arranged that they can be operated from the engineer's normal position in the cab. Pantographs that automatically rise when released shall have an automatic locking device to secure them in the down position.

(b) Each pantograph operating on an overhead trolley wire shall have a device for locking and grounding it in the lowest position, that can be applied and released only from a position where the operator has a clear view of the pantograph and roof without mounting the roof.

Guidance:

The pantograph control switches or buttons are usually located on or near the engineer's control panel and should be operated by railroad personnel only. **Inspectors should be alert when inspecting locomotives and MU locomotives in electrified territory.** They should consider the catenary system and the current-carrying parts of the third rail system to be energized and dangerous at all times. Inspectors should not get on the roof of any equipment when it is under the catenary system. Extreme care should be exercised with the use and handling of metal gauges and tools around electrical equipment and especially third rail equipment.

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Regulation:

§229.79 Third rail shoes.

When locomotives are equipped with both third rail and overhead collectors, third-rail shoes shall be de-energized while in yards and at stations when current collection is exclusively from the overhead conductor.

Guidance:

Inspectors should be aware that considerable force is exerted on third-rail shoe beams when in operation. Therefore, these beams must be properly secured on brackets and not split and cracked.

Regulation:

§229.85 Doors and cover plates marked "Danger."

All doors and cover plates guarding high voltage equipment shall be marked "Danger--High Voltage" or with the word "Danger" and the normal voltage carried by the parts so protected.

Guidance:

This item should only be reported as a defect if there are no markings to indicate an obvious area of high voltage. If the car body doors into the main generator or alternator generator compartment are marked "Danger-High Voltage" or "Danger" but the generator itself does not have each and every cover so marked, especially if the covers are bolted in place, it should not be reported as a defect. Some logic has to be used by the Inspector to determine if there is any imminent danger versus a technical defect in the absence of a cover not being marked.

Regulation:

§229.89 Jumpers; cable connections.

(a) Jumpers and cable connections between locomotives shall be so located and guarded to provide sufficient vertical clearance. They may not hang with one end free.

(b) Cable and jumper connections between locomotive may not have any of the following conditions:

- (1) Broken or badly chafed insulation.
- (2) Broken plugs, receptacles or terminals.
- (3) Broken or protruding strands of wire.

Guidance:

Section (a): Jumper cables with one end hanging loose should not be taken as a violation when the locomotive is found standing unattended and the locomotive is not **in use** or assigned for service. Conversely, if locomotives are observed in use with one end of the jumper cable hanging free, appropriate enforcement action should be taken. This applies to a locomotive standing in a yard or within the confines of a locomotive servicing area.

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Inspectors should periodically lift the jumper receptacle lid to ensure that all terminal pins are in suitable condition for service. In addition, the jumper housing should be inspected to ensure that it seals properly and is free of cracks.

Regulation:

§229.91 Motors and generators.

A motor or a generator may not have any of the following conditions:

- (a) Be shorted or grounded.
- (b) Throw solder excessively.
- (c) Show evidence of coming apart.
- (d) Have an overheated support bearing.
- (e) Have an excessive accumulation of oil.

Guidance:

One of the defects most often reported is accumulation of oil. The key word in the regulation is **excessive**. If the accumulation over the exterior of the motor or generator is not excessive, it should not be reported. Also if it is an old accumulation as evidenced by debris and dirt, and no fresh oil is found, it should not be reported as a defect.

Regulation:

§229.93 Safety cut-off device.

The fuel line shall have a safety cut-off device that --

- (a) Is located adjacent to the fuel supply tank or in another safe location;
- (b) Closes automatically when tripped and can be reset without hazard; and
- (c) Can be hand operated from clearly marked locations, one inside the cab and one on each exterior side of the locomotive.

Guidance:

Since the introduction of the EMD GP-30 series locomotives in the 1950's and the GE U-25 series, the fuel safety cut-off devices have been incorporated in the emergency shut down switches. The earlier fuel safety cut-off devices consisted of a mechanical valve manually operated through a cable system from three locations. Reset of this valve is also manual. Safety shut-off devices of this type must be operable from three locations, one in the cab and one on each exterior side of the locomotive. The MP&E Inspector is not to operate the safety cut-off device. The Inspector should request the railroad to demonstrate the function on random inspections and whenever there is reason to believe the device is inoperable,. If the required marking is missing or incomplete, a violation should not be filed, but it should be brought to the attention of the railroad for correction. As a result of an accident involving a runaway Union Pacific (UP) freight train that derailed at Hayden, California, the Federal Railroad Administration (FRA) published a Notice of Safety Bulletin in the Federal Register on January 30, 1997. The notice requires all railroads to inspect

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locomotives to determine if the emergency MU fuel cut-off switch is located in such a position that it can be inadvertently activated by the engineer. Inadvertent actuation of such a switch located at knee level to the engineer is suspected as the cause of this accident.

During normal inspections, FRA Inspectors should carefully examine the locomotive fuel cut-off switch for vulnerability to inadvertent actuation. When a locomotive is found to have such vulnerability, the Inspector should work with the railroads to comply with the Notice of Safety Bulletin as quickly as possible. Any disagreements arising over whether a switch is vulnerable or not, that can not be resolved at the regional level, should be referred to the Motive Power and Equipment Staff Director. (MP&E 98-60)

Regulation:

§229.95 Venting.

§229.97 Grounding fuel tanks.

Fuel tanks and related piping shall be electrically grounded.

Guidance:

Note that there is no requirement for any type of fuel level gauge at the fuel oil reservoirs. Generally, all locomotives have fuel sight glasses of some type, but they are for the railroad's convenience, as is the automatic fuel shut-off equipment that is used when fueling locomotives.

Regulation:

§229.99 Safety hangers.

Drive shafts shall have safety hangers.

Guidance:

The drive shaft hangers described in this section deal with a shaft which, if disconnected, could fall to the track structure and cause a derailment. These types of drive shafts are found on locomotives in which the motive power uses a mechanical drive system to power the drive axles; e.g. Budd Company RDCs and the French Turbo trains.

Regulation:

§229.101 Engines.

(a) The temperature and pressure alarms, controls and related switches of internal combustion engines shall function properly.

(b) Whenever an engine has been shut down due to mechanical or other problems, a distinctive warning notice giving reason for the shut-down shall be conspicuously attached near the engine starting control until repairs have been made.

(c) Wheel slip/slide protection shall be provided on a locomotive with an engine displaying a warning notice whenever required by §229.115(b).

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Guidance:

Section (a) The Inspector should be alert to safety switches being nullified when inspecting the diesel engine on locomotives. Where actual tampering of the engine protective devices is found, violations should be considered.

Regulation: Steam Generators

§229.103 Safe working pressure; factor of safety.

The safe working pressure for each steam generator shall be fixed by the chief mechanical officer of the carrier. The minimum factor of safety shall be four. The fixed safe working pressure shall be indicated on FRA Form F 6180-49A.

§229.105 Steam generator number.

An identification number shall be marked on the steam generator's separator and that number entered on FRA Form F 6180-49A.

§229.107 Pressure gauge.

(a) Each steam generator shall have an illuminated steam gauge that correctly indicates the pressure. The steam pressure gauge shall be graduated to not less than one and one-half times the allowed working pressure of the steam generator.

(b) Each steam pressure gauge on a steam generator shall have a siphon that prevents steam from entering the gauge. The pipe connection shall directly enter the separator and shall be steam-tight between the separator and the gauge.

§229.109 Safety valves.

Every steam generator shall be equipped with at least two safety valves that have a combined capacity to prevent an accumulation of pressure of more than five pounds per square inch above the allowed working pressure. The safety valves shall be independently connected to the separator and located as closely to the separator as possible without discharging inside of the generator compartment. The ends of the safety valve discharge lines shall be located or protected so that discharged steam does not create a hazard.

§229.111 Water-flow indicator.

(a) Steam generators shall be equipped with an illuminated visual return water-flow indicator.

(b) Steam generators shall be equipped with an operable test valve or other means of determining whether the steam generator is filled with water. The fill test valve may not discharge steam or hot water into the steam generator compartment.

§229.113 Warning notice.

Whenever any steam generator has been shut down because of defects, a distinctive warning notice giving reasons for the shut-down shall be conspicuously attached near the steam generator starting controls until the necessary repairs have been made. The

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locomotive in which the steam generator displaying a warning notice is located may continue in service until the next periodic inspection.

Guidance:

The steam generator regulations are not included in their entirety because there are none in service at the present time. The Inspector should refer to the current CFR Part 229 if a steam generator is found in service in his/her district.

Amtrak and the commuter railroads use electricity to heat the passenger cars, operate air conditioning units, provide train lighting, and for all other ancillary equipment. The power source is usually a generator installed in the diesel-electric locomotive or an inverter in the electric current. Generators could be a stand-alone engine/generator unit located on a car, in an auxiliary car, or in a compartment of the locomotive. This equipment is to be inspected by the FRA Inspectors. It is the railroad's responsibility to maintain the equipment in a safe and suitable condition for service and all deficiencies should be reported under §229.45.

Regulation:

§229.115 Slip/slide alarms.

(a) Except for MU locomotives, each locomotive used in road service shall be equipped with a device that provides an audible or visual alarm in the cab of either slipping or sliding wheels on powered axles under power. When two or more locomotives are coupled in multiple or remote control, the wheel slip/slide alarm of each locomotive shall be shown in the cab of the controlling locomotive.

(b) Except as provided in §229.9, an equipped locomotive may not be dispatched in road service, or continue in road service following a daily inspection, unless the wheel slip/slide protective device of whatever type --

(1) Is functioning for each powered axle under power; and

(2) Would function on each powered axle if it were under power.

(c) Effective January 1, 1981, all new locomotives capable of being used in road service shall be equipped with a device that detects wheel slip/slide for each powered axle when it is under power. The device shall produce an audible or visual alarm in the cab.

Guidance:

On most DC powered traction motors, the slip/slide device is nullified when a traction motor is cut-out. Therefore, movement of a locomotive with a DC traction motor cut-out can only be made under the provisions of § 229.9. GE provided information concerning wheel slip slide and wheel lock protection provided on the GE Dash 8 and Dash 9 locomotive models. These wheel slip /wheel lock devices function independent of the DC electrical energy provided to power the traction motors. FRA determined that since the wheel slip/slide detection remains fully active, even though one or more of the traction motors are cut-out, it is not a safety related item and is in proper

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condition and safe to operate without unnecessary peril to life and limb under 49 CFR 229.7. This condition also meets the requirements for slip/slide alarms under 49 CFR 229.115. Being consistent with its enforcement guidance and policies relating to wheel slip/slide and wheel lock on alternating current locomotives, FRA takes no exception to the continued use of locomotives with wheel slip/slide alarms described above provided all of the following conditions are met:

Locomotives so equipped will not be permitted to operate with defective or cut-out traction motors beyond any periodic inspection required under 49 CFR 229.23; and

Any railroad operating such locomotives must clearly identify within the operating cab of the locomotive that the locomotive is utilizing the wheel slip/slide design as described in this letter within the operating cab of the locomotive.

Locomotives operating with AC traction motors have a wheel slip/slide detection system that remains active regardless of whether an inverter and related traction motor is cut-out. With the slip/slide system active, FRA has determined that a cut-out AC traction motor/inverter is not a safety-related item and does not take exception to the continued use of locomotives with the AC traction motor cut-out, provided the locomotives does not operate with the defective or cut-out traction motor beyond the periodic inspection required under 49 CFR 229,23. This applies to both GE and EMD locomotives.

Section (a) The wheel slip/slide device must be provided either an audible or visual alarm in the cab; only one is required. In a multiple-locomotive consist, the wheel slip/slide action which may occur on a trailing locomotive or on a remote-controlled locomotive must activate a device which can be heard or seen in the cab of the controlling locomotive. This also applies to locomotives operating in DPU service.

Section (b) The exclusion to this requirement is included in Section 229.101 (b) and (c).

Section (c) Only MU locomotives built prior to January 1, 1981 are excluded from this rule. MU locomotives built after this date must be equipped as required by this section (a). All MU locomotives which have powered wheels equipped with slip/slide protection must maintain and have such equipment in operating condition.

Regulation:

§229.117 Speed indicators.

(a) After December 31, 1980, each locomotive used as a controlling locomotive at speeds in excess of 20 miles per hour shall be equipped with a speed indicator which is --

(1) Accurate within ± 3 miles per hour of actual speed at speeds of 10 to 30 miles per

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hour and accurate within ± 5 miles per hour at speeds above 30 miles per hour; and
(2) Clearly readable from the engineer's normal position under all light conditions.
(b) Each speed indicator required shall be tested as soon as possible after departure by means of speed test sections or equivalent procedures.

Guidance:

Section (a) The Inspector must recognize that this regulation has several qualifiers; (1) the locomotive must be a controlling locomotive, and (2) it must be on a train which will exceed a speed of 20 mph. These two criteria must be met before enforcement procedures can be instituted. If a locomotive is placed in service in a non-controlling position without a speed indicator or an inoperative speed indicator, the locomotive is in compliance with this section. This section applies to MU locomotives and when it was promulgated, the FRA informed the affected commuter lines that they could apply for waivers.

Section (b) If a speed indicator of a controlling locomotive becomes inoperative en route, it may continue in service under the provision of section 229.9. It does not require the railroad to reduce the train speed to 20 mph or less. If the non-complying condition can be brought into compliance by shifting the position of the locomotive in the consist, the non-complying condition should be rectified by doing so at the next forward location. This could be a siding, a wye, or any location where it is physically possible to reposition the locomotive without endangering the safety of employees, locomotives or train. **(MP&E 98-50)**

If the Inspector can develop a case in which a railroad dispatched a controlling locomotive with a reported defective speed indicator, suitable enforcement action should be taken.

Regulation:

§229.119 Cabs, floors, and passageways.

(a) Cab seats shall be securely mounted and braced. Cab doors shall be equipped with a secure and operable latching device.

(b) Cab windows of the lead locomotive shall provide an undistorted view of the right-of-way for the crew from their normal position in the cab. (See also, Safety Glazing Standards, 49 CFR part 223, 44 FR 77348, Dec. 31, 1979.)

(c) Floors of cabs, passageways, and compartments shall be kept free from oil, water, waste or any obstruction that creates a slipping, tripping or fire hazard. Floors shall be properly treated to provide secure footing.

(d) The cab shall be provided with proper ventilation and with a heating arrangement that maintains a temperature of at least 50 degrees Fahrenheit 6 inches above the center of each seat in the cab.

(e) Similar locomotives with open end platforms coupled in multiple control and used in road service shall have a means of safe passage between them; no passageway is required through the nose of car body locomotives. There shall be a continuous barrier across the full width of the end of a locomotive or a continuous barrier between locomotives.

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(f) Containers shall be provided for carrying fusees and torpedoes. A single container may be used if it has a partition to separate fusees from torpedoes. Torpedoes shall be kept in a closed metal container.

Guidance:

Section(a) Cab seats should be reported as defective only when they are not securely mounted and braced. Wall-mounted seat bracket guideways should have no openings in them which allow the seat bracket to inadvertently fall out. Hydraulic cab seats should be checked for operation and leaks.

Section (b) Cab window defects can only be reported if they interfere with the crew's undistorted view of the right-of-way from their normal seated position in the cab. This is a performance standard which should be sufficient to require the railroads to properly maintain such things as windshield wipers and defrosters to meet this standard. Defective cab windows for any other reason may either be taken under the glazing regulations, Part 223, or if broken and sharp edges create a personal injury hazard under Section 229.45.

Section (c) Accumulations of oil, water, debris and other items on passageway, walkways, cab control compartment floors, or engine compartment floors should be of such a nature as to present a **potential hazard and unsafe condition** for any person who **would use them**, e.g. slipping, tripping, or does not provide secure footing. When an Inspector discovers these conditions, he/she should also determine the source and take appropriate enforcement action. The regulation does not require that such things as portable ice chests or crew luggage be secured in the cab, but if these items create a personal injury hazard they should be addressed.

Locomotive air compressor compartments are routinely utilized for the storage of tools and materials for servicing the locomotive and train (i.e.. air hoses, jumper cables, wrenches, etc.), thereby requiring train crew members to enter the air compressor compartment to retrieve many of these items. If the floor in the air compressor compartment is cluttered with loose material or is covered with oil, a tripping or slipping hazard exists.

Several railroads are currently installing toolboxes on their locomotives in the doorway leading into the air compressor compartment. The toolbox location is identified and all other doors leading into the air compressor compartment are marked for maintenance personnel only. The railroad believes that by removing the tools from the compartment and denying access to all except maintenance personnel, the slipping hazard has been removed. In addition, maintenance personnel entering the compartment are required to inspect the floor first and then remove any slipping or tripping hazard prior to entry.

In late 1999, an MP&E Technical Resolution Committee (TRC) examined the application of §229.119(c) relevant to air compressor compartments, in light of the scenario noted above. Based on the discussions and recommendations developed by that Committee, FRA has determined that

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the presence of oil on the floor of the locomotive air compressor compartment does not constitute a slipping or tripping hazard under §229.119(c), if **all** of the following conditions are complied with:

- ! Train crews are prohibited from entering the air compressor compartment by general order, bulletin order, time table instructions, or other formal instructions;
- ! The air compressor compartment doors are stenciled to indicate that train crew members are not to enter the compartments;
- ! Tool storage compartments are readily and clearly identified by stencils;
- ! Tool storage compartments are self-contained units, arranged and designed so that any tools or materials falling from the storage hooks or rack do not fall onto the floor of air compressor compartment;
- ! When a train crew member identifies (without entering the compartment) a slipping hazard in the air compressor compartment, the condition is listed on the inspection report (current or next daily). Identification of such a condition should not be treated as a non-complying condition under part 229, if all other conditions contained in this bulletin are otherwise met;
- ! When any tools or materials intended for use by the train crew are found on the air compartment floor, the condition is treated as a tripping hazard, a non-complying condition under §229.119(c), and corrective action is taken;
- ! Railroads should continue to clean the air compressor compartment as necessary in a timely fashion.

FRA Inspectors should take appropriate enforcement action, if there is oil on the air compressor compartment floor that creates a slippery condition **and** there is a tool, part, or material inside that may be needed by a train crew member, even though all other conditions noted above have been met (e.g. restricted access, separate tool storage compartment area).

Furthermore, if the locomotive is not properly stenciled, as noted above, or the train crew is unaware of the access restrictions to the air compressor compartment, then any loose material or oil on the air compressor compartment floor that creates a slipping or tripping hazard would constitute non-compliance with §229.119(c) and appropriate enforcement action should be taken. **(MP&E 00-05)**

Section (e) The regulation does not require that a locomotive connected with another locomotive has to have an open end platform. It only requires that if the locomotive does not have a continuous barrier, such as a solid handrail, then the passage between the two locomotives must be safe and protected by chains or other devices. Continuous barrier missing should not be reported as a defect if the locomotive is not being **used** and is inspected in a locomotive service facility. Although there are no minimum height restrictions when a chain is used, Inspectors should ensure the chain does not present a tripping hazard.

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Regulation:

§229.121 Locomotive cab noise.

(a) After August 31, 1980, the permissible exposure to a continuous noise in a locomotive cab shall not exceed an eight-hour time-weighted average of 90dB(A), with a doubling rate of 5dB(A) as indicated in the table. Continuous noise is any sound with a rise time of more than 35 milliseconds to peak intensity and a duration of more than 500 milliseconds to the time when the level is 20dB below the peak.

Duration permitted (hours)	Sound level (dB(A))
12.....	87
8.....	90
6.....	92
4.....	95
2.....	100
1½	102
1.....	105
½	110
¼ or less.....	115

(b) When the continuous noise exposure is composed of two or more periods of noise exposure of different levels, their combined effect shall be considered. Exposure to different levels for various periods of time shall be computed according to the following formula:

$$D = T_1/L_1 + T_2/L_2 + \dots + T_n/L_n$$

where:

D = noise dose.

T = the duration of exposure (in hours) at a given continuous noise level.

L = the limit (in hours) for the level present during the time T (from the table).

If the value of D exceeds 1, the exposure exceeds permissible levels.

(c) Exposure to continuous noise shall not exceed 115dB(A).

(d) Noise measurements shall be made under typical operating conditions using a sound level meter conforming, at a minimum, to the requirements of ANSI S1.4-1971, Type 2, and set to an A-weighted slow response or with an audio dosimeter of equivalent accuracy and precision.

(e) In conducting sound level measurements with a sound level meter, the microphone shall be oriented vertically and positioned approximately 15 centimeters from and on

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axis with the crew member's ear. Measurements with an audio dosimeter shall be conducted in accordance with manufacturer's procedures as to microphone placement and orientation.

Guidance:

Training in the use of the current model of the dosimeter is the responsibility of the Safety Improvement and Development Team. If the railroad has a hearing conservation program in place (mandatory use of hearing protection), FRA Inspectors should not take exception to noise levels in the cab of the locomotive in excess of the regulations.

Regulation:

§229.123 Pilots, snowplows, end plates.

After January 1, 1981, each lead locomotive shall be equipped with an end plate that extends across both rails, a pilot, or a snowplow. The minimum clearance above the rail of the pilot, snowplow or end plate shall be 3 inches, and the maximum clearance 6 inches.

Guidance:

This section also applies to MU locomotives. Keep in mind, several railroads have been granted conditional waivers which allow the maximum height to be greater than 6 inches for locomotives used in hump yard service. For a locomotive consist, this requirement only applies to the lead locomotive. The measurement should be taken on relatively level track. The Inspector should not defect a locomotive for a minimal deviation of the height requirement. The railroad should be told to adjust the end arrangement so that it is in compliance.

Regulation:

§229.125 Headlights and auxiliary lights.

(a) Each lead locomotive used in road service shall have a headlight that produces a peak intensity of at least 200,000 candela. If a locomotive or locomotive consist in road service is regularly required to run backward for any portion of its trip other than to pick up a detached portion of its train or to make terminal movements, it shall also have on its rear a headlight that produces at least 200,000 candela. Each headlight shall be arranged to illuminate a person at least 800 feet ahead and in front of the headlight. For purposes of this sections, a headlight shall be comprised of either one or two lamps.

(1) If a locomotive is equipped with a single lamp headlight, the single lamp shall produce a peak intensity of at least 200,000 candela. The following meet the standard set forth in this paragraph (a)(1): a single PAR-56, 200 watt, 30-volt lamp; or a lamp of equivalent design and intensity.

(2) If a locomotive is equipped with a dual-lamp headlight, a peak intensity of 200,000 candela shall be produced by the headlight based either on a single lamp capable of individually producing the required peak intensity or on the candela produced by the

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headlight with both lamps illuminated. If both lamps are needed to produce the required peak intensity, then both lamps in the headlight shall be operational. The following meet the standard set forth in this paragraph (a)(2): a single PAR-56, 200-watt, 30-volt lamp; two operative PAR-56, 350-watt, 75-volt lamps; or a lamp(s) of equivalent design and intensity.

(b) Each locomotive or locomotive consist used in yard service shall have two headlights, one located on the front of the locomotive or locomotive consist and one on its rear. Each headlight shall produce at least 60,000 candela and shall be arranged to illuminate a person at least 300 feet ahead and in front of the headlight.

(c) Headlights shall be provided with a device to dim the light.

(d) Effective December 31, 1997, each lead locomotive operated at a speed greater than 20 miles per hour over one or more public highway-rail crossings shall be equipped with operative auxiliary lights, in addition to the headlight required by paragraph (a) or (b) of this section. A locomotive equipped on March 6, 1996 with auxiliary lights in conformance with §229.133 shall be deemed to conform to this section until March 6, 2000. All locomotives in compliance with §229.133(c) shall be deemed to conform to this section. Auxiliary lights shall be composed as follows:

(1) Two white auxiliary lights shall be placed at the front of the locomotive to form a triangle with the headlight.

(i) The auxiliary lights shall be at least 36 inches above the top of the rail, except on MU locomotives and control cab locomotives where such placement would compromise the integrity of the car body or be otherwise impractical. Auxiliary lights on such MU locomotives and control cab locomotives shall be at least 24 inches above the top of the rail.

(ii) The auxiliary lights shall be spaced at least 36 inches apart if the vertical distance from the headlight to the horizontal axis of the auxiliary lights is 60 inches or more.

(iii) The auxiliary lights shall be spaced at least 60 inches apart if the vertical distance from the headlight to the horizontal axis of the auxiliary lights is less than 60 inches.

(2) Each auxiliary light shall produce a peak intensity of at least 200,000 candela or shall produce at least 3,000 candela at an angle of 7.5 degrees and 400 candela at an angle of 20 degrees from the centerline of the locomotive when the light is aimed parallel to the tracks. Any of the following meet the standard set forth in this paragraph (d)(2): a PAR-56, 200-watt, 30-volt lamp; a PAR-56, 350-watt, 75-volt lamp; or a lamp of equivalent design and intensity.

(3) The auxiliary lights shall be focused horizontally within 15 degrees of the longitudinal centerline of the locomotive.

(e) Auxiliary lights required by paragraph (d) of this section may be arranged

(1) to burn steadily or

(2) flash on approach to a crossing.

If the auxiliary lights are arranged to flash;

(i) they shall flash alternately at a rate of at least 40 flashes per minute and at most 180 flashes per minute,

(ii) the railroad's operating rules shall set a standard procedure for use of flashing lights at public highway-rail grade crossings, and

(iii) the flashing feature may be activated automatically, but shall be capable of manual

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activation and deactivation by the locomotive engineer.

(f) Auxiliary lights required by paragraph (d) of this section shall be continuously illuminated immediately prior to and during movement of the locomotive, except as provided by railroad operating rules, timetable or special instructions, unless such exception is disapproved by FRA. A railroad may except use of auxiliary lights at a specific public highway-rail grade crossing by designating that exception in the railroad's operating rules, timetable, or a special order. Any exception from use of auxiliary lights at a specific public grade crossing can be disapproved for a stated cause by FRA's Associate Administrator for Safety or any one of FRA's Regional Administrators, after investigation by FRA and opportunity for response from the railroad.

(g) Movement of locomotives with defective auxiliary lights.

(1) A lead locomotive with only one failed auxiliary light must be repaired or switched to a trailing position before departure from the place where an initial terminal inspection is required for that train.

(2) A locomotive with only one auxiliary light that has failed after departure from an initial terminal, must be repaired not later than the next calendar inspection required by §229.21.

(3) A lead locomotive with two failed auxiliary lights may only proceed to the next place where repairs can be made. This movement must be consistent with §229.9.

(h) Any locomotive subject to Part 229, that was built before December 31, 1948, and that is not used regularly in commuter or intercity passenger service, shall be considered historic equipment and excepted from the requirements of paragraphs (d) through (h) of this section.

Guidance:

The candela rating established in this section corresponds to the intensity level implicitly required under the prior rules in Part 230. That rule was more a detailed performance standard which required not only that it illuminate a person 800 feet ahead and in front of the headlight, but that the engineer in the operating compartment possess the visual capacity to see in a clear atmosphere a dark object as large as a man of average size standing erect at least 800 feet ahead and in front of the headlight.

The Inspector should also be aware that the qualifier in this section is that only the **lead locomotive** must be equipped with the prescribed headlight. Intermediate locomotives in a consist with inoperative headlights are not to be considered as non-complying. Also, the requirement for rear headlights on road locomotives has certain conditions. The Inspector should take appropriate enforcement action when a headlight is found defective. However, if the locomotive has a light arrangement using two sealed beam headlights, the Inspector must ascertain whether they are the 200-watt, 30-volt lamps or if they are the 350-watt, 75-volt lamps. The reason for this is because if the dual light system is using the 200-watt, 30-volt lamps, both lamps would have to be defective before enforcement action can be taken. However, the Inspector should take appropriate enforcement action if one of the bulbs is defective on dual-light systems using the 350-watt, 75-volt lamps.

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There have been instances where some locomotives have had the auxiliary lights (ditch lights) installed in a manner which covers a portion of the uncoupling levers, which serve as the end handhold on a locomotive. If this condition exist, it should be handled for correction.

The following questions and answers are from a previously issued Technical Bulletin that addressed the many inquiries concerning the application, operation, and inspection requirements of auxiliary lights:

When does a locomotive have to be equipped with auxiliary lights?

Each lead locomotive that operates over one or more public grade crossings at a speed greater than 20 miles per hour, shall be equipped with operative auxiliary lights on the forward end of the locomotive as it approaches a public highway-rail grade crossing.

What is a public highway-rail crossing as it applies to auxiliary lights?

It is the location where railroad tracks intersect a roadway which is part of the general system of public streets and highways, and is under the jurisdiction of and maintained by a public authority and open to the general traveling public.

What are auxiliary lights?

Auxiliary lights are two white lights producing at least 200,000 candela that are located on the front of the locomotive to form a triangle with the locomotive headlight. They must be mounted at least 36 inches above the top of the rail, except on MU locomotives and control cab locomotives where such placement would be impractical. On such MU locomotives and cab control locomotives, the lights shall be mounted at least 24 inches above the top of the rail. Other mounting and focusing requirements are listed in §229.125(d). There are other arrangements that are “grandfathered” to satisfy auxiliary light requirements.

What are the grandfathered arrangements?

- ① Oscillating Lights installed on newly-acquired equipment that was ordered prior to January 1, 1996, satisfies the auxiliary light requirements for the life of the locomotive. If it was installed after January 1, 1996, it does not qualify.
- ② Strobe Lights that were applied to the locomotive prior to March 6, 1996, will satisfy the auxiliary light requirements until the locomotive is either retired or rebuilt (whichever comes first), but the speed of the locomotive is restricted to 40 miles per hour when used as a lead locomotive.
- ③ Two white auxiliary lights spaced at least 44 inches apart on at least one axis, and that were installed on the locomotive prior to May 30, 1994, satisfies the auxiliary light requirements until the locomotive is either rebuilt or retired, whichever comes first. *This is the headlight arrangement commonly used in commuter service.*

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Do auxiliary lights have to work when a calendar day inspection is performed?

Auxiliary lights are treated the same as headlights when calendar day inspections are performed.

When do the auxiliary lights have to be illuminated?

Auxiliary lights must remain continuously illuminated immediately prior to and during the movement of the locomotive, except as provided by railroad operating rules, timetables, or special instructions. This not only increases conspicuity at public highway-rail grade crossings, but also addresses private crossings, pedestrians, and roadway workers.

Do the lights have to flash on approaching a crossing?

The lights may burn steadily or flash (pulse) on approach and while passing over a public highway-rail grade crossing.

Are there circumstances where the lights can be legally extinguished?

Yes. The regulations permit railroads to designate specific locations where auxiliary lights can be extinguished, as long as these designated locations are identified in either the railroad's operating rules, timetable, or special written instructions. This would typically be at locations where existing operating rules require the headlight to be dimmed, such as: at stations; when passing another train; in yards where switching is performed; or at locations where train operations parallel a public highway and the night vision of motorists would be impaired by the use of auxiliary lights. Any exceptions from use of auxiliary lights at specific locations are subject to disapproval by FRA's Associate Administrator for Safety, or one of FRA's Regional Administrators, after investigation and opportunity for response by the railroad, for good cause stated.

Can a train be dispatched from initial terminal without auxiliary lights on the lead locomotive?

If the lead locomotive is not equipped with auxiliary lights, the train can be dispatched out of an initial terminal, with the understanding that the locomotive cannot operate over any public highway-rail grade crossing at a speed greater than 20 miles per hour. Otherwise, if the lead locomotive is equipped with auxiliary lights, all must be functioning on the end of the locomotive in the forward direction of the train movement.

Can the train leave initial terminal with one light defective on the lead locomotive?

No, all auxiliary lights must be working on the lead locomotive in the forward direction of the train movement.

What about en route failures?

If one light becomes defective en route, the locomotive can continue to operate in the lead at track speed, but the defective light must be repaired no later than the next calendar day. This locomotive could not be used in the lead position out of an initial terminal unless repairs were made. If two lights become defective en route, the locomotive (train) may only proceed to the next location where repairs can be made and the locomotive is restricted to 20 miles per hour or less over all public highway-rail grade crossings until the lights are functioning.

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If the mechanism that causes the oscillating light to oscillate is defective, how should this condition be treated?

This would be treated as a complete failure of the auxiliary light. It could not be dispatched from an initial terminal as a lead unit, and if the failure occurred en route, it would have to be repaired at the next point where repairs could be made with the locomotive restricted to 20 miles per hour over all public highway-rail grade crossings.

Are locomotives that operate in both directions (dual-control) required to be equipped with auxiliary lights on each end of the locomotive?

These types of locomotives should be equipped on each end, since they frequently operate as a lead in both directions. However, if a locomotive is equipped with auxiliary lights on only one end, then it could only be dispatched out of an initial terminal as the lead unit, if the equipped end is placed in the forward direction of the train movement. If during the trip this same locomotive made a reverse move as a lead unit, it would be restricted to 20 miles per hour over all public highway-rail grade crossings.

When a speed restriction at a public highway-rail grade crossing is required, does this mean the whole train is restricted to 20 miles per hour over the crossing?

No, just the lead locomotive is restricted to 20 miles per hour over the crossing.

Are steam locomotives required to be equipped with auxiliary lights?

No. Also, any locomotive built before December 31, 1948, that is not used in commuter or inter-city passenger service, is excepted from auxiliary light requirements. (MP&E 98-3)

Regulation:

§229.127 Cab lights.

(a) Each locomotive shall have cab lights which will provide sufficient illumination for the control instruments, meters, and gauges to enable the engine crew to make accurate readings from their normal positions in the cab. These lights shall be located, constructed, and maintained so that light shines only on those parts requiring illumination and does not interfere with the crew's vision of the track and signals. Each controlling locomotive shall also have a conveniently located light that can be readily turned on and off by the persons operating the locomotive and that provides sufficient illumination for them to read train orders and timetables.

(b) Cab passageways and compartments shall have adequate illumination.

Guidance:

Section (b) The preamble to this rule states that it was intended to be similar to the former rule, 230.233(b), which includes the qualifier that when employees are required to pass from one cab to another, the platform and passageway between shall be illuminated. There are no passageways on the road-switcher type of locomotives; these are found on the car body type locomotives where people walk inside and illumination is important. Lights that are inside the car body of a road-

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switcher type locomotive are not to be considered as compartment lights and shall not be taken as a non-complying condition. Where the criteria for a passageway exist, illumination must be provided and the lights maintained. The same is true for the walkway platforms between locomotives found on road-switchers. A flashlight or other hand-held light does not satisfy the requirements of this rule.

Regulation:

§229.129 Audible warning device.

(a) After August 31, 1980, each lead locomotive shall be provided with an audible warning device that produces a minimum sound level of 96db(A) at 100 feet forward of the locomotive in its direction of travel. The device shall be arranged so that it can be conveniently operated from the engineer's normal position in the cab.

(b) Measurement of the sound level shall be made using a sound level meter conforming, at a minimum, to the requirements of ANSI S1.4-1971, Type 2, and set to an A-weighted slow response. While the locomotive is on level tangent track, the microphone shall be positioned 4 feet above the ground at the center line of the track, and shall be oriented with respect to the sound source in accordance with the manufacturer's recommendations.

(c) A 4dB(A) measurement tolerance is allowable for a given measurement.

Guidance:

This section pertains to all locomotives. Again the Inspector is reminded that the lead locomotive must be provided with the required audible warning device. The regulation does not take into consideration the location and direction of the warning device, but wherever it is located, it must meet the standard as determined by the test criteria. If a locomotive is found to have an inoperative warning device, it may not be used as a lead locomotive. If the locomotive is found with an apparent low sounding warning device, determination for compliance can only be made with an approved noise dosimeter.

The locomotive bell does not constitute a warning device under this section. The bell is considered an appurtenance of the locomotive and as such must be maintained in a safe and suitable condition for service. An inoperative bell is to be reported under section 229.7.

Regulation:

§229.131 Sanders.

Except for MU locomotives, each locomotive shall be equipped with operable sanders that deposit sand on each rail in front of the first power operated wheel set in the direction of movement.

Guidance:

The section has two qualifiers, in that **MU locomotives are exempt** and that **each locomotive** in a consist shall have operable sanders that deposit sand **in front of the first power-operated wheel set in the direction of movement**. At a servicing facility where the direction of a

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locomotive or locomotive consist is not known, the Inspector should require the railroad to have all out-board sanders operational prior to departure. On the other hand, if a locomotive is inspected at the head end of the train, only the sanders in the direction of the train movement must be operational. Locomotives used in yard switching service, which normally move in both directions, should have the outboard sanders operational. A hole in the sand delivery pipe is not an inoperative sander. The mere presence of a hole in the sander hose or pipe is not sufficient to establish a violation under 229.131, without detailed discussion of the hole's impact on the sander's ability to operate. FRA is required to establish that the sander is not depositing sand in front of the wheel. **However, if sand is being discharged at eye level and constitutes a personal injury hazard, it should be reported under 229.45.**

Regulation:

§229.133 Interim locomotive conspicuity measures -- auxiliary external lights.

Guidance:

Guidance for this Subpart can be found under §229.125 - **Headlights and auxiliary lights.**

Regulation:

§229.135 Event recorders.

(a) Duty to equip and record. Except as provided in paragraphs (c) and (d) of this section, a train operated faster than 30 miles per hour shall have an in-service event recorder, of the type described in paragraph (b) of this section, in the lead locomotive. The presence of the event recorder shall be noted on Form FRA F6180-49A (by writing the make and model of event recorder with which the locomotive is equipped) under the REMARKS section, except that an event recorder designed to allow the locomotive to assume the lead position only if the recorder is properly functioning is not required to have its presence noted on Form FRA F6180-49A. For the purpose of this section, "train" includes a locomotive or group of locomotives with or without cars. The duty to equip the lead locomotive may be met with an event recorder located elsewhere than the lead locomotive provided that such event recorder monitors and records the required data as though it were located in the lead locomotive. The event recorder shall record the most recent 48 hours of operation of the electrical system of the locomotive on which it is installed.

(b) Equipment requirements. Event recorders shall monitor and record data elements required by this paragraph with at least the accuracy required of the indicators displaying any of the required elements to the engineer.

(1) A lead locomotive originally ordered before October 1, 2006, and placed in service before October 1, 2009, including a controlling remote distributed power locomotive, a lead manned helper locomotive, a DMU locomotive, and an MU locomotive, except as provided in paragraphs (c) and (d) of this section, shall have an in-service event recorder that records the following data elements:

- (i) Train speed;
- (ii) Selected direction of motion;

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- (iii) Time;
- (iv) Distance;
- (v) Throttle position;
- (vi) Applications and operations of the train automatic air brake;
- (vii) Applications and operations of the independent brake;
- (viii) Applications and operations of the dynamic brake, if so equipped; and
- (ix) Cab signal aspect(s), if so equipped and in use.

(2) A locomotive originally manufactured before October 1, 2006, and equipped with an event recorder that uses magnetic tape as its recording medium shall have the recorder removed from service on or before October 1, 2009 and replaced with an event recorder with a certified crashworthy event recorder memory module that meets the requirements of Appendix D of this part and that records at least the same number of data elements as the recorder it replaces.

(3) A lead locomotive, a lead manned helper locomotive, and a controlling remotely distributed power locomotive, other than a DMU or MU locomotive, originally ordered on or after October 1, 2006 or placed in service on or after October 1, 2009, shall be equipped with an event recorder with a certified crashworthy event recorder memory module that meets the requirements of Appendix D of this part. The certified event recorder memory module shall be mounted for its maximum protection. (Although other mounting standards may meet this standard, an event recorder memory module mounted behind and below the top of the collision posts and above the platform level is deemed to be mounted “for its maximum protection.”) The event recorder shall record, and the certified crashworthy event recorder memory module shall retain, the following data elements:

- (i) Train speed;
- (ii) Selected direction of motion;
- (iii) Time;
- (iv) Distance;
- (v) Throttle position;
- (vi) Applications and operations of the train automatic air brake, including emergency applications. The system shall record, or provide a means of determining, that a brake application or release resulted from manipulation of brake controls at the position normally occupied by the locomotive engineer. In the case of a brake application or release that is responsive to a command originating from or executed by an on-board computer (e.g., electronic braking system controller, locomotive electronic control system, or train control computer), the system shall record, or provide a means of determining, the involvement of any such computer;
- (vii) Applications and operations of the independent brake;
- (viii) Applications and operations of the dynamic brake, if so equipped;
- (ix) Cab signal aspect(s), if so equipped and in use;
- (x) End-of-train (EOT) device loss of communication front to rear and rear to front;
- (xi) Electronic controlled pneumatic braking (ECP) message (and loss of such message), if so equipped;
- (xii) EOT armed, emergency brake command, emergency brake application;
- (xiii) Indication of EOT valve failure;
- (xiv) EOT brake pipe pressure (EOT and ECP devices);

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- (xv) EOT marker light on/off;
- (xvi) EOT “low battery” status;
- (xvii) Position of on/off switch for headlights on lead locomotive;
- (xviii) Position of on/off switch for auxiliary lights on lead locomotive;
- (xix) Horn control handle activation;
- (xx) Locomotive number;
- (xxi) Locomotive automatic brake valve cut in;
- (xxii) Locomotive position in consist (lead or trail);
- (xxiii) Tractive effort;
- (xxiv) Cruise control on/off, if so equipped and in use; and
- (xxv) Safety-critical train control data routed to the locomotive engineer’s display with which the engineer is required to comply, specifically including text messages conveying mandatory directives, and maximum authorized speed. The format, content, and proposed duration for retention of such data shall be specified in the product safety plan submitted for the train control system under subpart H of part 236 of this chapter, subject to FRA approval under this paragraph. If it can be calibrated against other data required by this part, such train control data may, at the election of the railroad, be retained in a separate certified crashworthy memory module.

(4) A DMU locomotive and an MU locomotive originally ordered on or after October 1, 2006 or placed in service on or after October 1, 2009, shall be equipped with an event recorder with a certified crashworthy event recorder memory module that meets the requirements of Appendix D of this part. The certified event recorder memory module shall be mounted for its maximum protection. (Although other mounting standards may meet this standard, an event recorder memory module mounted behind the collision posts and above the platform level is deemed to be mounted “for its maximum protection.”) The event recorder shall record, and the certified crashworthy event recorder memory module shall retain, the following data elements:

- (i) Train speed;
- (ii) Selected direction of motion;
- (iii) Time;
- (iv) Distance;
- (v) Throttle position;
- (vi) Applications and operations of the train automatic air brake, including emergency applications. The system shall record, or provide a means of determining, that a brake application or release resulted from manipulation of brake controls at the position normally occupied by the locomotive engineer. In the case of a brake application or release that is responsive to a command originating from or executed by an on-board computer (e.g., electronic braking system controller, locomotive electronic control system, or train control computer), the system shall record, or provide a means of determining, the involvement of any such computer;
- (vii) Applications and operations of the independent brake, if so equipped;
- (viii) Applications and operations of the dynamic brake, if so equipped;
- (ix) Cab signal aspect(s), if so equipped and in use;
- (x) Emergency brake application(s);
- (xi) Wheel slip/slide alarm activation (with a property-specific minimum duration);
- (xiii) Lead locomotive headlight activation switch on/off;

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- (xiv) Lead locomotive auxiliary lights activation switch on/off;
- (xv) Horn control handle activation;
- (xvi) Locomotive number;
- (xvii) Locomotive position in consist (lead or trail);
- (xviii) Tractive effort;
- (xix) Brakes apply summary train line;
- (xx) Brakes released summary train line;
- (xxi) Cruise control on/off, if so equipped and used; and
- (xxii) Safety-critical train control data routed to the locomotive engineer's display with which the engineer is required to comply, specifically including text messages conveying mandatory directives, and maximum authorized speed. The format, content, and proposed duration for retention of such data shall be specified in the product safety plan submitted for the train control system under subpart H of part 236 of this chapter, subject to FRA approval under this paragraph. If it can be calibrated against other data required by this part, such train control data may, at the election of the railroad, be retained in a separate certified crashworthy memory module.

(5) A locomotive equipped with an event recorder that is remanufactured, as defined in this part, on or after October 1, 2007, shall be equipped with an event recorder with a certified crashworthy event recorder memory module that meets the requirements of Appendix D to this part and is capable of recording, at a minimum, the same data as the recorder that was on the locomotive before it was remanufactured.

(6) An event recorder originally manufactured after January 1, 2010, that is installed on any locomotive identified in paragraph (b)(1) of this section shall be an event recorder with a certified crashworthy event recorder memory module that meets the requirements of Appendix D to this part and that is capable of recording, at a minimum, the same data as the event recorder that was previously on the locomotive.

(c) Removal from service. Notwithstanding the duty established in paragraph (a) of this section to equip certain locomotives with an in-service event recorder, a railroad may remove an event recorder from service and, if a railroad knows that an event recorder is not monitoring or recording required data, shall remove the event recorder from service. When a railroad removes an event recorder from service, a qualified person shall record the date that the device was removed from service on Form FRA F6180-49A, under the REMARKS section, unless the event recorder is designed to allow the locomotive to assume the lead position only if the recorder is properly functioning.

(d) Response to defective equipment. Notwithstanding the duty established in paragraph (a) of this section to equip certain locomotives with an in-service event recorder, a locomotive on which the event recorder has been taken out of service as provided in paragraph (c) of this section may remain as the lead locomotive only until the next calendar-day inspection. A locomotive with an inoperative event recorder is not deemed to be in improper condition, unsafe to operate, or a non-complying locomotive under §§ 229.7 and 229.9, and, other than the requirements of Appendix D of this part, the inspection, maintenance, and testing of event recorders are limited to the requirements set forth in §§ 229.25(e) and 229.27(d).

(e) Preserving accident data. If any locomotive equipped with an event recorder, or any other locomotive-mounted recording device or devices designed to record information concerning the

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functioning of a locomotive or train, is involved in an accident/incident that is required to be reported to FRA under part 225 of this chapter, the railroad that was using the locomotive at the time of the accident shall, to the extent possible, and to the extent consistent with the safety of life and property, preserve the data recorded by each such device for analysis by FRA. This preservation requirement permits the railroad to extract and analyze such data, *provided* the original downloaded data file, or an unanalyzed exact copy of it, shall be retained in secure custody and shall not be utilized for analysis or any other purpose except by direction of FRA or the National Transportation Safety Board. This preservation requirement shall expire one (1) year after the date of the accident unless FRA or the Board notifies the railroad in writing that the data are desired for analysis.

(f) Relationship to other laws. Nothing in this section is intended to alter the legal authority of law enforcement officials investigating potential violation(s) of State criminal law(s), and nothing in this chapter is intended to alter in any way the priority of National Transportation Safety Board investigations under 49 U.S.C. 1131 and 1134, nor the authority of the Secretary of Transportation to investigate railroad accidents under 49 U.S.C. 5121, 5122, 20107, 20111, 20112, 20505, 20702, 20703, and 20902.

(g) Disabling event recorders. Except as provided in paragraph (c) of this section, any individual who willfully disables an event recorder is subject to civil penalty and to disqualification from performing safety-sensitive functions on a railroad as provided in § 218.55 of this chapter, and any individual who tampers with or alters the data recorded by such a device is subject to a civil penalty as provided in appendix B of part 218 of this chapter and to disqualification from performing safety-sensitive functions on a railroad if found unfit for such duties under the procedures in part 209 of this chapter.

Guidance:

- ! Requires replacement, by October 1, 2009, of each event recorder utilizing magnetic tape as a storage medium with a certified crashworthy event recorder memory module (ERMM) capable of recording at least the same data elements as the recorder it replaces. Any magnetic tape recorder replaced after October 1, 2005, must be replaced with a certified crashworthy event recorder memory module.
- ! Requires all new lead locomotives, lead manned helper locomotives, and controlling distributive power locomotives (ordered after October 1, 2006 or placed in service after October 1, 2009) to be equipped with a certified crashworthy ERMM capable of recording up to 25 data elements for traditional locomotives and 22 data elements for MU and DMU locomotives.
- ! Requires all remanufactured locomotives after October 1, 2007 to be equipped with a certified crashworthy ERMM capable of recording at least the same data elements as the event recorder on that locomotive prior to remanufacture.

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- ! Requires event recorders originally manufactured after January 1, 2010, and installed on a covered locomotive to be equipped with a certified crashworthy ERMM.
- ! Contains specific performance criteria for determining the crashworthiness of an ERMM. These include criteria for fire, impact shock, static crush, fluid immersion, and hydrostatic pressure and contains testing sequence requirements. The criteria are based on existing crashworthiness standards of the Institute of Electrical and Electronics Engineers, Inc. (IEEE), modified for the locomotive environment.
- ! Requires preservation of event recorder data for a period of one year for any locomotive involved in an accident or incident required to be reported to FRA under part 225.
- ! Provides relief from the periodic inspection requirements for micro-processor based event recorders with self-monitoring features. Requires inspection of these types of event recorders annually.

Regulation:

§229.137 Sanitation, general requirements.

(a) *Sanitation compartment.* Except as provided in paragraph (b) of this section, all lead locomotives in use shall be equipped with a sanitation compartment. Each sanitation compartment shall be:

(1) Adequately ventilated;

(2) Equipped with a door that:

(i) Closes, and

(ii) Possesses a modesty lock by October 4, 2003;

(3) Equipped with a toilet facility, as defined in this part;

(4) Equipped with a washing system, as defined in this part, unless the railroad otherwise provides the washing system to employees upon reporting for duty or occupying the cab for duty, or where the locomotive is equipped with a stationary sink that is located outside of the sanitation compartment;

(5) Equipped with toilet paper in sufficient quantity to meet employee needs, unless the railroad otherwise provides toilet paper to employees upon reporting for duty or occupying the cab for duty; and

(6) Equipped with a trash receptacle, unless the railroad otherwise provides portable trash receptacles to employees upon reporting for duty or occupying the cab for duty.

(b) *Exceptions.* (1) Paragraph (a) of this section shall not apply to:

(i) Locomotives engaged in commuter service or other short-haul passenger service and commuter work trains on which employees have ready access to railroad-provided sanitation facilities outside of the locomotive or elsewhere on the train, that meet otherwise applicable sanitation standards, at frequent intervals during the course of their work shift;

(ii) Locomotives engaged in switching service on which employees have ready access to railroad-provided sanitation facilities outside of the locomotive, that meet otherwise

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applicable sanitation standards, at frequent intervals during the course of their work shift;

(iii) Locomotives engaged in transfer service on which employees have ready access to railroad-provided sanitation facilities outside of the locomotive, that meet otherwise applicable sanitation standards, at frequent intervals during the course of their work shift;

(iv) Locomotives of Class III railroads engaged in operations other than switching service or transfer service, that are not equipped with a sanitation compartment as of June 3, 2002. Where an unequipped locomotive of a Class III railroad is engaged in operations other than switching or transfer service, employees shall have ready access to railroad-provided sanitation facilities outside of the locomotive that meet otherwise applicable sanitation standards, at frequent intervals during the course of their work shift, or the railroad shall arrange for en route access to such facilities;

(v) Locomotives of tourist, scenic, historic, or excursion railroad operations, which are otherwise covered by this part because they are not propelled by steam power and operate on the general railroad system of transportation, but on which employees have ready access to railroad-provided sanitation facilities outside of the locomotive, that meet otherwise applicable sanitation standards, at frequent intervals during the course of their work shift; and

(vi) Except as provided in §229.14 of this part, control cab locomotives designed for passenger occupancy and used in intercity push-pull service that are not equipped with sanitation facilities, where employees have ready access to railroad-provided sanitation in other passenger cars on the train at frequent intervals during the course of their work shift.

(2) Paragraph (a)(3) of this section shall not apply to:

(i) Locomotives of a Class I railroad which, prior to June 3, 2002, were equipped with a toilet facility in which human waste falls via gravity to a holding tank where it is stored and periodically emptied, which does not conform to the definition of toilet facility set forth in this section. For these locomotives, the requirements of this section pertaining to the type of toilet facilities required shall be effective as these toilets become defective or are replaced with conforming units, whichever occurs first. All other requirements set forth in this section shall apply to these locomotives as of June 3, 2002; and

(ii) With respect to the locomotives of a Class I railroad which, prior to June 3, 2002, were equipped with a sanitation system other than the units addressed by paragraph (b)(2)(i) of this section, that contains and removes human waste by a method that does not conform with the definition of toilet facility as set forth in this section, the requirements of this section pertaining to the type of toilet facilities shall apply on locomotives in use on July 1, 2003. However, the Class I railroad subject to this exception shall not deliver locomotives with such sanitation systems to other railroads for use, in the lead position, during the time between June 3, 2002, and July 1, 2003. All other requirements set forth in this section shall apply to the locomotives of this Class I railroad as of June 3, 2002.

(c) *Defective, unsanitary toilet facility; prohibition in lead position.* Except as provided in paragraphs (c)(1) through (5) of this section, if the railroad determines during the

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daily inspection required by §229.21 that a locomotive toilet facility is defective or is unsanitary, or both, the railroad shall not use the locomotive in the lead position. The railroad may continue to use a lead locomotive with a toilet facility that is defective or unsanitary as of the daily inspection only where all of the following conditions are met:

- (1) The unsanitary or defective condition is discovered at a location where there are no other suitable locomotives available for use, i.e., where it is not possible to switch another locomotive into the lead position, or the location is not equipped to clean the sanitation compartment if unsanitary or repair the toilet facility if defective;
- (2) The locomotive, while non-compliant, did not pass through a location where it could have been cleaned if unsanitary, repaired if defective, or switched with another compliant locomotive, since its last daily inspection required by this part;
- (3) Upon reasonable request of a locomotive crewmember operating a locomotive with a defective or unsanitary toilet facility, the railroad arranges for access to a toilet facility outside the locomotive that meets otherwise applicable sanitation standards;
- (4) If the sanitation compartment is unsanitary, the sanitation compartment door shall be closed and adequate ventilation shall be provided in the cab so that it is habitable; and
- (5) The locomotive shall not continue in service in the lead position beyond a location where the defective or unsanitary condition can be corrected or replaced with another compliant locomotive, or the next daily inspection required by this part, whichever occurs first.

(d) *Defective, unsanitary toilet facility; use in trailing position.* If the railroad determines during the daily inspection required by §229.21 that a locomotive toilet facility is defective or is unsanitary, or both, the railroad may use the locomotive in trailing position. If the railroad places the locomotive in trailing position, they shall not haul employees in the unit unless the sanitation compartment is made sanitary prior to occupancy. If the toilet facility is defective and the unit becomes occupied, the railroad shall clearly mark the defective toilet facility as unavailable for use.

(e) *Defective, sanitary toilet facility; use in switching, transfer service.* If the railroad determines during the daily inspection required by §229.21 that a locomotive toilet facility is defective, but sanitary, the railroad may use the locomotive in switching service, as set forth in paragraph (b)(1)(ii) of this section, or in transfer service, as set forth in paragraph (b)(1)(iii) of this section for a period not to exceed 10 days. In this instance, the railroad shall clearly mark the defective toilet facility as unavailable for use. After expiration of the 10-day period, the locomotive shall be repaired or used in the trailing position.

(f) *Lack of toilet paper, washing system, trash receptacle.* If the railroad determines during the daily inspection required by §229.21 that the lead locomotive is not equipped with toilet paper in sufficient quantity to meet employee needs, or a washing system as required by paragraph (a)(4) of this section, or a trash receptacle as required by paragraph (a)(6) of this section, the locomotive shall be equipped with these items prior to departure.

(g) *Inadequate ventilation.* If the railroad determines during the daily inspection required by §229.21 that the sanitation compartment of the lead locomotive in use is not adequately ventilated as required by paragraph (a)(1) of this section, the railroad

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shall repair the ventilation prior to departure, or place the locomotive in trailing position, in switching service as set forth in paragraph (b)(1)(ii) of this section, or in transfer service as set forth in paragraph (b)(1)(iii) of this section.

(h) *Door closure and modesty lock.* If the railroad determines during the daily inspection required by §229.21 that the sanitation compartment on the lead locomotive is not equipped with a door that closes, as required by paragraph (a)(2)(i) of this section, the railroad shall repair the door prior to departure, or place the locomotive in trailing position, in switching service as set forth in paragraph (b)(1)(ii) of this section, or in transfer service as set forth in paragraph (b)(1)(iii) of this section. If the railroad determines during the daily inspection required by §229.21 that the modesty lock required by paragraph (a)(2)(ii) of this section is defective, the modesty lock shall be repaired pursuant to the requirements of §229.139(e).

(i) *Equipped units; retention and maintenance.* Except where a railroad downgrades a locomotive to service in which it will never be occupied, where a locomotive is equipped with a toilet facility as of [the effective date of the final rule], the railroad shall retain and maintain the toilet facility in the locomotive consistent with the requirements of this part, including locomotives used in switching service pursuant to paragraph (b)(1)(ii) of this section, and in transfer service pursuant to paragraph (b)(1)(iii) of this section.

(j) *Newly manufactured units; in-cab facilities.* All locomotives manufactured after June 3, 2002, except switching units built exclusively for switching service and locomotives built exclusively for commuter service, shall be equipped with a sanitation compartment accessible to cab employees without exiting to the out-of-doors for use. No railroad may use a locomotive built after June 3, 2002, that does not comply with this subsection.

(k) *Potable water.* The railroad shall utilize potable water where the washing system includes the use of water.

§229.139 -- Sanitation, servicing requirements.

(a) The sanitation compartment of each lead locomotive in use shall be sanitary.

(b) All components required by §229.137(a) for the lead locomotive in use shall be present consistent with the requirements of this part, and shall operate as intended such that:

(1) All mechanical systems shall function;

(2) Water shall be present in sufficient quantity to permit flushing;

(3) For those systems that utilize chemicals for treatment, the chemical (chlorine or other comparable oxidizing agent) used to treat waste must be present; and

(4) No blockage is present that prevents waste from evacuating the bowl.

(c) The sanitation compartment of each occupied locomotive used in switching service pursuant to §229.137(b)(1)(ii), in transfer service pursuant to §229.137(b)(1)(iii), or in a trailing position when the locomotive is occupied, shall be sanitary.

(d) Where the railroad uses a locomotive pursuant to §229.137(e) in switching or transfer service with a defective toilet facility, such use shall not exceed 10 calendar days from the date on which the defective toilet facility became defective. The date on

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which the toilet facility becomes defective shall be entered on the daily inspection report.

(e) Where it is determined that the modesty lock required by §229.137(a)(2) is defective, the railroad shall repair the modesty lock on or before the next 92-day inspection required by this part.

Guidance:

There are several types of locomotive cab toilet facilities in use today. Micophor, Envirovac Vacuum Systems (EVAC), and Motive Equipment, Inc. (MEI) are a few of the most common types.

The Norfolk Southern Railway and Amtrak primarily use the EVAC systems.

MICROPHOR uses a two-tank system, the only one of its kind. Human waste is deposited in the tank directly below; when flushed, it is passed by way of piping into a chemical (chlorine) holding tank for biological break-down, then passed out to a drip pipe to atmosphere (right-of-way). NOTE: See figure 2, page 70, which demonstrates how a Microphor toilet operates.

Other manufacturer's toilets use only one tank. The same tank that waste is passed into is used as a holding tank. The flush simply opens a flapper and forces clean water to wash or rinse the bowl and then allows the waste to pass into the tank below where it is biologically (chemically) broken down. If the proper amount of chlorine is used and the tank is not over filled to capacity, it is retained until it is sucked out by the railroad maintenance person when it is time for service. Remember, this type of toilet is only one tank.

The most common causes for locomotive toilet systems failing, regardless of the manufacturer, is the lack of maintenance by the railroads, vandalism, and paper towels and/or various other types of foreign matter being introduced into the toilet system. Toilet systems are designed to break down only human waste and common toilet paper, nothing else.

Surveys indicate that any kind of paper towel will clog and foul these toilet systems. By being too thick to be broken down by the chlorine, it clogs the system and makes the filtering system ineffective.

The quality and/or lack of maintenance by the railroads greatly contribute to non-compliance problems. Individual railroads are responsible for maintenance schedules. The frequency of maintenance and servicing really depends on the use of the facility, the number of crewmembers, crew changes and use by outside parties. Often, servicing personnel are guilty of using the wrong or improper chemicals to break down the bacteria in the toilet systems. Also, if an improper cleaning agent is used to clean the toilet, it can contaminate and render the toilet's chemicals ineffective.

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The most common complaints are:

1. Toilet Compartment Stinks/Dirty;
2. System Toilet Tank Plugged;
3. Toilet Does Not Flush;
4. Lack of or No Water In Holding Tank;
5. Waste System Pipe Leaks;
6. Water Tank Leaks;
7. Strong Chlorine Odor In Toilet Compartment;
8. Low Voltage Ground From Tank Heating System;
9. (Models w/ holding tanks) Full/Overflowing Tanks;
10. Insufficient Chlorine In Chlorinator;
11. Strong Chlorine Odor In Cab (Poor or No Ventilation);
12. Vent Pipe or Vent Hole Plugged;
13. Waste Holding Tank or Fresh Water Holding Tank Frozen;
14. Broken/Damaged Chlorinator Cap/Seals;
15. Loose Chlorine Slugs On Floor In Toilet Compartment;
16. Toilet Does Not Flush;
17. Tampons and/or Feminine Napkins Found In Toilet Bowls - Impossible To Be Broken Down In Chlorine. This is becoming more of a common problem since the rise of female employees throughout the railroad system.

Section 229.137(c) prohibits a railroad from placing a locomotive with an unsanitary or defective toilet in the lead position. The railroad makes this determination *at the time of the daily inspection* required by §229.21. In order for FRA take a violation of §229.137(c), among other things, FRA must show that the railroad determined at the time of the daily inspection that the locomotive toilet facility was defective and/or unsanitary. Without that showing, FRA will not be able to sustain a violation.

This also applies if FRA wants to take violations under §229.137(d)-(h). For each of those sections, FRA must show that the railroad made the determination (of lack of toilet paper or inadequate ventilation or lack of a modesty lock, etc) at the time of the daily inspection.

As noted in the preamble to the Final Rule, en route failures that occur after the daily inspection impose no burden on the railroad until the next daily inspection is due. According to Working Group members involved in drafting the rule, the current railroad practice concerning en route toilet failures is to move defective toilets into the trailing position, where it is possible to do so. Please note, however, that the final rule does *not* require such a movement.

Proper Ventilation:

Ventilation is a serious problem. Some of the problems found during a field survey are that the vent caps have been pulled off or removed and the vent pipe has been plugged with paper towels. With the toilet in use and no ventilation, the odor will soon migrate into the cab and crew area of the locomotive.

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Some railroads simply cut a hole in the nose of the cab and place a vent over it, to avoid outside debris from entering the toilet compartment. This is the basic system using ambient air to circulate. It works best when the toilet compartment door is closed and the locomotive is in motion. However, some railroads have installed a positive pressure ventilation system. This is done by a pipe that runs from the toilet compartment through the cab wall and into the engine room exhaust fan compartment. This system vents even if the locomotive is standing still and the toilet compartment door open. **Note:** This system still works best with the toilet compartment door closed. Some locomotives will not vent while standing still. They only vent with the locomotive in motion, and when the toilet compartment door is kept closed. This is commonly known as negative air flow. However, this is not an exception nor a violation, if the door is open and the locomotive is standing still. If the toilet is operating properly and the door is closed with the locomotive standing still, the cab odor should be minimal and diminish when the locomotive is in motion. There are no specifications as to how a locomotive toilet facility can be or has to be vented. The important thing is that it works. Remember, all toilet compartments, regardless of type of locomotive or venting system, work best with the toilet compartment door closed.

Be aware that toilet compartment door gaskets (seals) make a difference in ventilation and should be replaced when needed. Although the regulation does not specifically address the door seals or gasket, Inspectors should note a defective door seal or gasket and inform the railroad supervisor in charge of locomotive repairs and/or service that the defective condition could lead to an odor problem, which could become a compliance issue.

Toilet Facility Lighting:

The sanitation regulations do not specifically address lighting for the toilet compartment. However, because the toilet facility is considered a compartment of the locomotive, the provisions of §229.127(b) would apply. Therefore, if the lighting is inadequate, missing, or inoperative, then it should be considered as a defect. Surveys have indicated that lighting problems are attributed to either the use of light bulbs with improper wattage, or burned out light bulbs. This can be also considered a tripping hazard, if the compartment is dark enough or even near black (0-Visibility). In the case of many older locomotives, appurtenances have been installed or retrofitted in the nose of the locomotive in such a manner as to impose an obstruction in the way of the toilet and in some cases can cause accident or injury to the person using the facility.

Modesty Locks:

Modesty lock means a latch that can be operated in the normal manner only from within the sanitary compartment, that is designed to prevent entry of another person when the sanitary compartment is in use. A modesty lock may be designed to allow deliberate forced entry in the event of an emergency.

Important Note: The modesty lock does not have to be able to be opened from the outside in an emergency. Most modesty locks currently in use consist of a secondary latch and are generally made of plastic and can easily be broken with moderate force. If the secondary latch is being used as a modesty lock and is broken, then this should be considered a defective modesty lock and

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handled in accordance with §229.139 (e).

Acceptable Forms of Sanitation (Personal Hygiene):

There should also be a sufficient quantity of fresh water, either for drinking or for washing or rinsing hands after using the toilet facility.

There are many types of acceptable forms of cleaning and washing solutions for crew members to utilize for personal hygiene. The most common is crew packs. This package contains waterless hand cleaner, paper towels, a small quantity of toilet paper and a trash bag. These are usually available either when the crew reports for duty or placed in the cab by railroad service employees. Some locomotives may also be equipped with sinks for washing hands. If this is the case, then an ample amount of water must be available for washing and rinsing hands. However, sinks are not mandatory, and even if a sink is in place, it may not be used if crew packs are available.

Regulation:

Subpart D -- Design Requirements
§229.141 Body structure, MU locomotives.

Guidance:

Although this Subpart is not expected to be used by the field Inspectors during routine inspection activity, it must be considered when conducting accident investigations, especially when there has been a head-on or rear end collision. Also, event recorder preservation requirements must be observed.